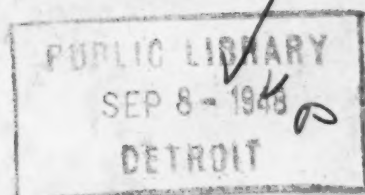


Coal Age

A MCGRAW-HILL PUBLICATION

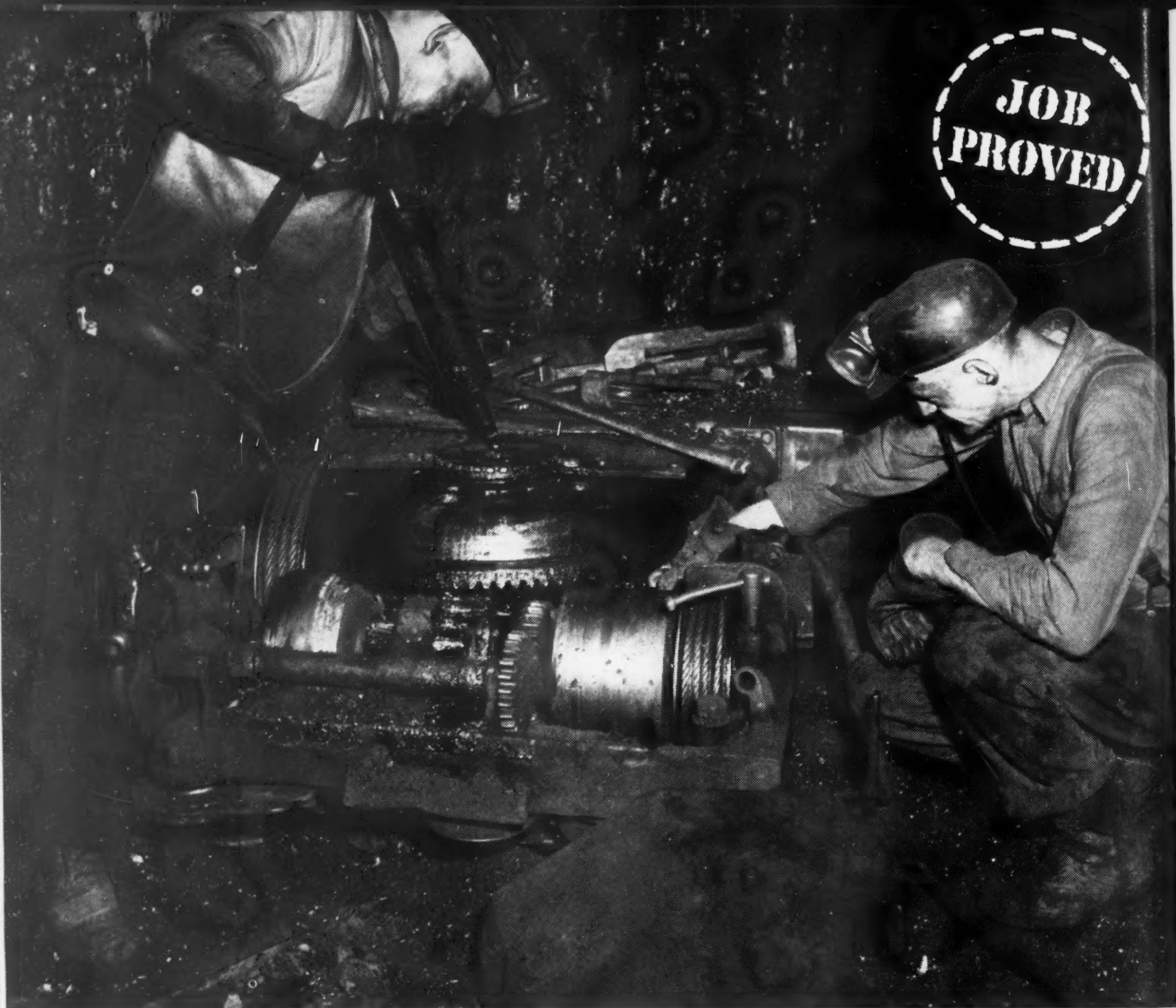
SEPTEMBER, 1948

TECHNOLOGY DEPARTMENT



SELLING SAFETYp. 74





CUTS COSTS FROM FACE TO TIPPLE

**To Control Soaring Costs, Coal Mine Adopts One Sun Lubricant
After Another—Now It's 100% Sun-Lubricated**

Trying one Sun product often leads to adoption of Sun products for every use. Take the case of a bituminous-coal operator whose profits were being whittled down by high lubrication costs. Four years ago, on the advice of one of our engineers, he tried out a Sun "Job Proved" mine car grease.

He found it the most satisfactory grease he had ever used—it lubri-

cated better, went farther, cost less. Next he adopted Sun oils and greases for the locomotives. Later he discarded a third competitive lubricant in favor of a Sun "Job Proved" product.

Finally he was convinced Sun oils and greases meant improved efficiency for every kind of mining equipment. Today the mine is 100 percent Sun-lubricated. With Sun

mine lubricants on the job the mine is enjoying the best lubrication, at the lowest cost, since the day it opened.

Here is a typical example of the advantages of Sun "Job Proved" mine lubricants. Whatever the machine, there is a Sun mine lubricant to keep it operating at maximum efficiency. For complete information, call your nearest Sun Office.

SUN OIL COMPANY • Philadelphia 3, Pa.

In Canada: Sun Oil Company, Ltd.

Toronto and Montreal

SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY



Research keeps
B.F. Goodrich
FIRST IN RUBBER



These tires work 67 hours for 24 hours' pay

WHEN one brand of tire lasts almost three times as long as another, you've got a real cost cutter working for you. That's exactly what one operator found when he made a test-check of his B.F. Goodrich Universal tires. The operation was strip mining . . . tough service. But the B.F. Goodrich tires averaged 4,571 hours against only 1,600 hours for another make of tire. The B.F. Goodrich tires did 67 hours of work for every 24 hours' work done by the other kind. Many other strip mine operators report similar experiences.

One reason for such marked difference in performance is the *double nylon shock shield* built into all B.F. Goodrich off-road tires size 11.00 and larger. This shield consists of 4 layers of strong, elastic nylon cord built in

between the tread rubber and the all-rayon cord body. The layers are in pairs; each pair running at scientifically determined angles with the other to give maximum strength—double bruise protection.

Under impact, each of the two pairs of cord plies in the shields stretch together, not across each other, and return to their original position. Because of this action, impact is *distributed*; absorbed. The rayon cord body is shielded from shock.

Only from B.F. Goodrich can you get the added protection of the double nylon shock shield—the added savings through (1) longer tire life, (2) increased bruise resistance, (3) less danger of tread separation, (4) more recappable tires.

In addition to nylon, Universal tires

are built with a specially compounded, cut-resisting tread. And, note the Universal tread design—husky, wedge-shaped cleats which protect the under tread and provide positive self-cleaning by forcing mud and dirt outward along the diagonal grooves.

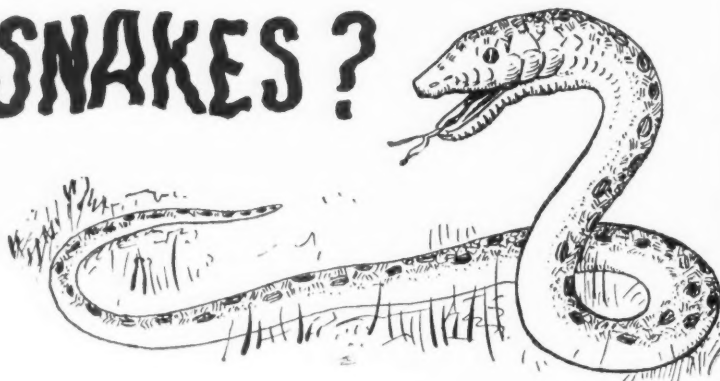
Find out how B.F. Goodrich off-road Silvertowns can help you pare your operating costs. There's a Silvertown for every need, every job. Get in touch with your BFG dealer or write us direct. *The B.F. Goodrich Company, Akron, Ohio.*

Truck Tires BY
B.F. Goodrich

Make no mistake

FOR
INSTANCE...

**Are you mistaken about
SNAKES ?**



Popular superstition has it that snakes don't die until sundown. The truth is that the bodies of snakes, like many lower animals, often retain a degree of life and a certain power of motion for some hours after a fatal injury has been inflicted.

It's hard to "kill" well-made coal mining machinery built to take punishment — but a bad lubricant will do it as quickly as anything we know of. On the other hand, the use of HULBURT QUALITY GREASE keeps coal mining machinery "alive" and healthy, with maximum power of motion, under the most grueling conditions—because that's the ONE job this grease is made to do supremely well. And HULBURT QUALITY GREASE does it!

HULBURT OIL & GREASE COMPANY—PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication

— for Coal Mine Lubrication

use



HULBURT

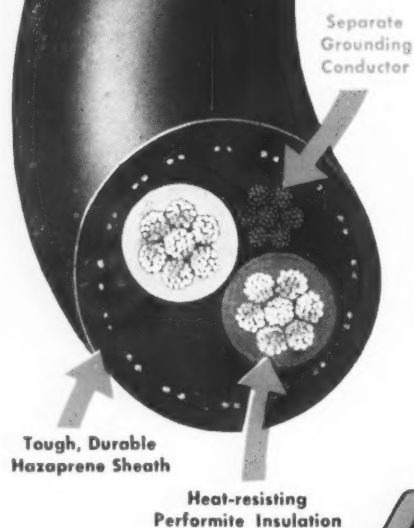
Quality **GREASE**

PROVEN BY PERFORMANCE

**DOWN
to EARTH
SAFETY...**



Hazacord Type G Mining Machine Cable with Separate Grounding Conductors



YOU can't buy a safer mining machine cable than Hazard Type G with its separate grounding conductors that assure a safe, down to earth connection at all times. In Hazard twin parallel cable construction, the grounding conductor is placed between the two power conductors; two conductor round cable has the ground wire laid in one of the interstices; in three conductor cable construction, the grounding conductor is usually split, one part in each of the three interstices.

And with Hazacord Mining Machine Cable, you get the extra safety, protection and long life provided by the well known Hazaprene jacket. Flame-resistant (Penna. Bureau of Mines Approval-104), abrasion, oil, water, and acid resistant, the Hazaprene jacket has proved itself again and again in the toughest kinds of service. What's more, Hazacord, always made with Performite heat-resisting insulation, safely carries approximately 25% more current than cable made with ordinary Performance grade insulation. Hazaprene fillers safeguard against moisture being drawn into the cable.

Have your Hazard representative show you point by point why Hazacords are your best buy from every angle. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

insulated wires and cables for every mining use

6032



Alfred M. Staehle, Publisher

IVAN A. GIVEN, Editor

J. H. Edwards

R. R. Richart

W. H. McNeal

W. A. Stanbury Jr.

F. A. Zimmerli

George E. Doying Jr., Washington

H. R. Mathias, General Manager

World News Offices: London, Paris,
Berlin, Moscow, Tokyo, Bombay,
Melbourne, Rio de Janeiro, Buenos
Aires



COAL AGE (with which is consolidated "The Colliery Engineer" and "Mines and Minerals") is published monthly on the 1st. Allow at least ten days for change of address.

Subscription rates: United States and possessions, \$5 for one year, \$8 for two years, \$10 for three years. Canada, \$6 for one year, \$10 for two years, \$12 for three years. Pan-American countries, \$6 for one year, \$10 for two years, \$12 for three years. All other countries, \$15 for one year, \$30 for three years. Single copies: U. S. and possessions and Canada, 50c; Pan American countries, 75c; all other countries, \$1.50. Application for second-class entry at the Post Office in Chicago, Ill., is pending under the Act of March 3, 1879. Printed in the U. S. A. Cable Address: "McGraw-Hill N. Y." Member A.B.P. Member A.B.C. Please indicate position and company connection on all subscription orders.

Return Postage Guaranteed

Contents Copyright 1948 by
McGraw-Hill Publishing Co., Inc.;
all rights reserved

JAMES H. McGRAW (1860-1948)
Founder

JAMES H. McGRAW JR.
President

CURTIS W. McGRAW
Vice-President and Treasurer

EUGENE DUFFIELD
Executive Assistant for Publications

NELSON BOND
Director of Advertising

JOSEPH A. GERARDI
Secretary

J. E. BLACKBURN JR.
Director of Circulation

Publication office: 210 South Desplaines St., Chicago 6, Ill. Editorial and executive offices, 330 W. 42nd St., New York 18, N. Y. Branch offices: 520 North Michigan Ave., Chicago 11; 68 Post St., San Francisco 4; Aldwych House, Aldwych, London, W.C. 2; Washington, 4; Philadelphia, 3; Cleveland, 15; Detroit, 26; St. Louis, 1; Boston, 16; Atlanta, 3; Los Angeles, 14; 738-9 Oliver Bldg., Pittsburgh, 22.

All communications about subscriptions should be addressed to the Director of Circulation, Coal Age, 210 South Desplaines St., Chicago 6, Ill., or 330 W. 42nd St., New York 18, N. Y.

District Managers: T. E. Alcorn and F. W. Roets, New York; W. A. Potter, Philadelphia; W. M. Spears, Cleveland; H. C. Chellson, Pittsburgh; C. J. Coash, G. A. Mack, Chicago.

CONTENTS

Volume 53

SEPTEMBER, 1948

Number 9

Selling Safety to the Miner	74
By W. A. STANBURY JR.	
Modern Mining at Gorgas	80
Truck Mines Haul on Rubber	91
High Extraction With Duckbills	94
By J. WILLIAM PERFATER	
Washery Small But Efficient	98
Shovel and Dragline Stripping	102
Grounding Off-Track Equipment	107
By JOSEPH A. SETTER	
Shovel's Circle Rails Changed in Three Days	118
Belt Winder Facilitates Conveyor Moves	122
Automatic Pump Equipped for Self-Priming	122
Shields on Switch Throws Minimize Rope Accidents	122
Concrete Cribbing Supports 600-Ft. Wall	124
Wheels Salvaged by Grinding	124
Editorials	73
Coal Men on the Job . . .	112
News Round-Up	127
Foremen's Forum . . .	114
Equipment News	168

CHANGE OF ADDRESS

Director of Circulation, COAL AGE

330 West 42nd St., New York 18, N. Y.

Please change the address of my COAL AGE subscription as follows:

Name

Old Address

New Address

New Company Connection

New Title or Position

"BEST TRACK WE EVER LAID!"



Another vote for prefabricated track. They finally got tired of a patched-up track system, put together with odds and ends. So they switched to Bethlehem's prefabricated. Now that it's in, they wish they'd done it years ago.

Maybe your own haulage system needs a going-over. If so, Bethlehem prefabricated track offers many advantages. For this is *planned* track—a system that's planned for your individual needs, down to the last bolt and nut. A layout developed after a Bethlehem engineer has studied your workings, your system of mining, your individual problems.

When this has been done, and you yourself have approved the plan submitted, Bethlehem precurves and precuts the rails, prefabricates other parts. The track comes to you ready for assembly, with rails clearly numbered (by bead weld) to make the job easy. No more than two men are needed to handle any one element.

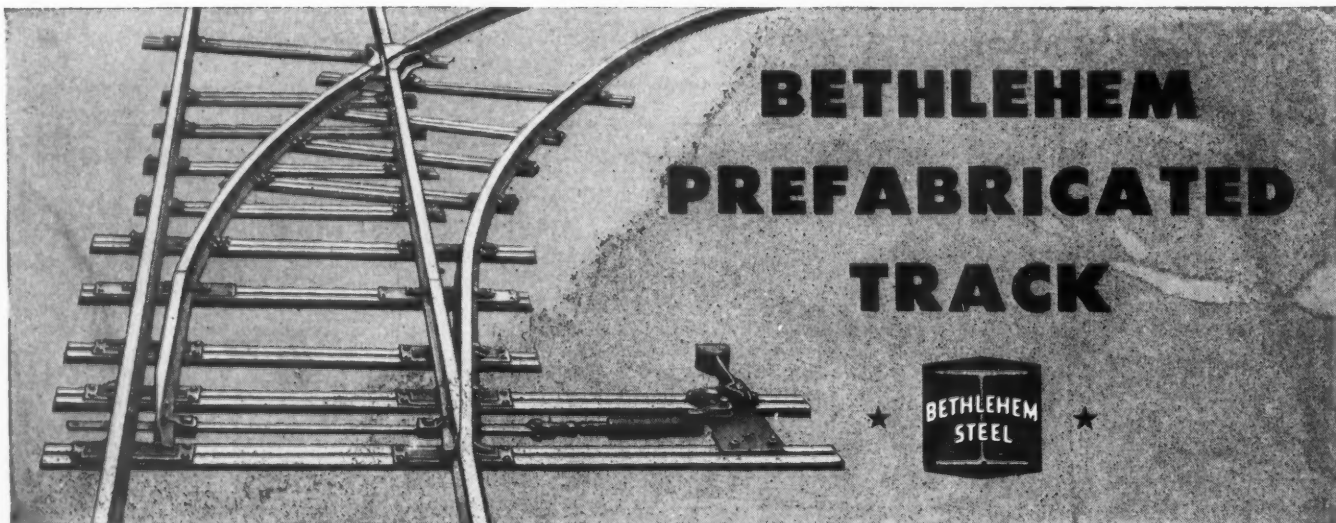
Results? Less rail required . . . quicker installation . . . faster, safer haulage . . . fewer maintenance worries . . . lower cost per ton hauled.

Expensive? No! Ask for full details.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

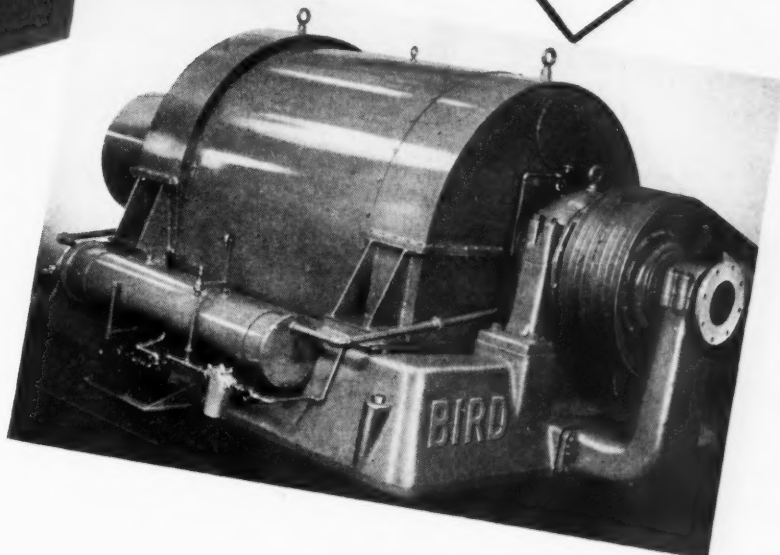
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation





THIS IS
THE WAY
TO DRY
IT



PUT it through the BIRD Continuous Centrifugal Filter, directly from the launders or tables, if you handle the fine coal separately — or feeding the settled fines and a quantity of overflow from the sludge tanks, if you wash all sizes together.

The coal is in excellent condition for blending or thermal drying. It contains not more than 6 - 10% moisture, the amount depending upon the proportion of the fines in the feed.

The filtrate is so low in solids that it may be continually returned to the cleaning equipment — thus achieving a closed water system.

One 54" BIRD handles forty or more tons per hour and operates for a long period of time without shutdowns for overhaul.

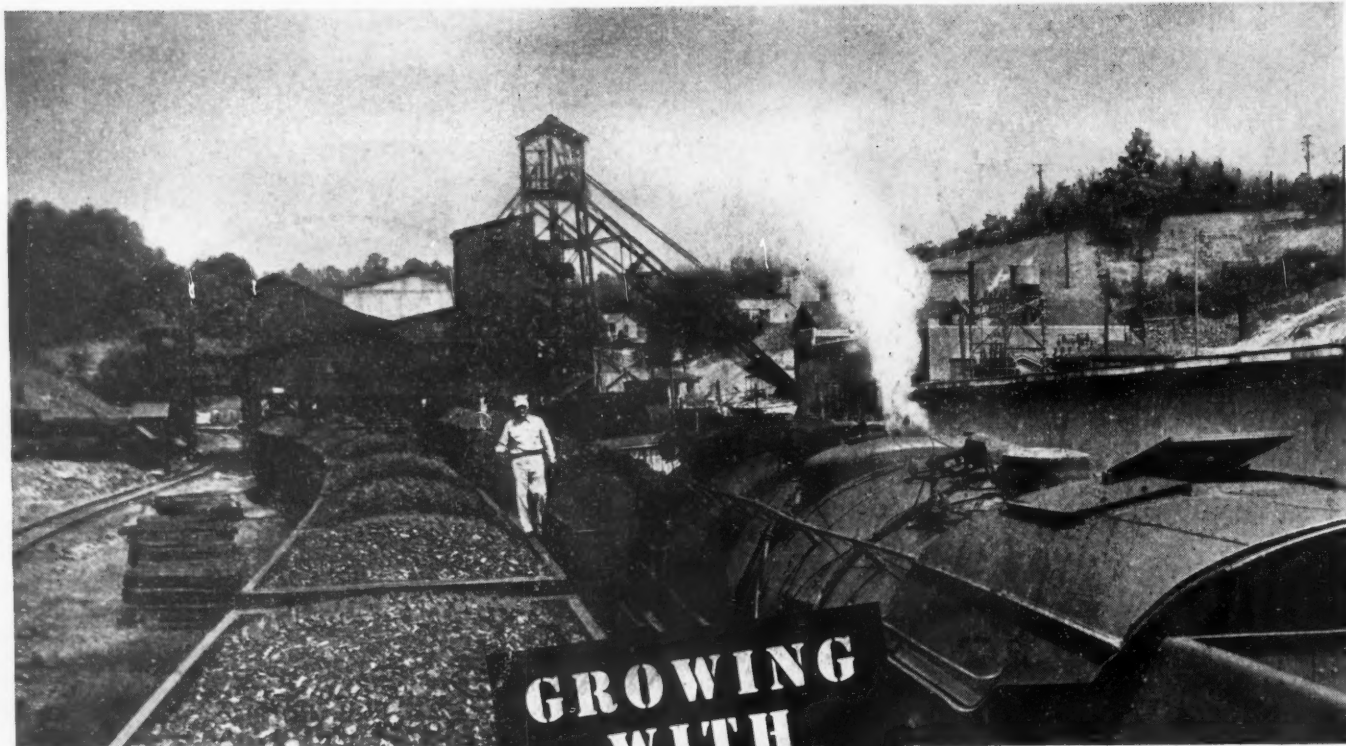
Whatever your cleaning system this is the best and most economical way to get the water out. Let us tell you more about it.

BIRD MACHINE COMPANY, South Walpole, Mass.

The

BIRD

Centrifugal FILTER



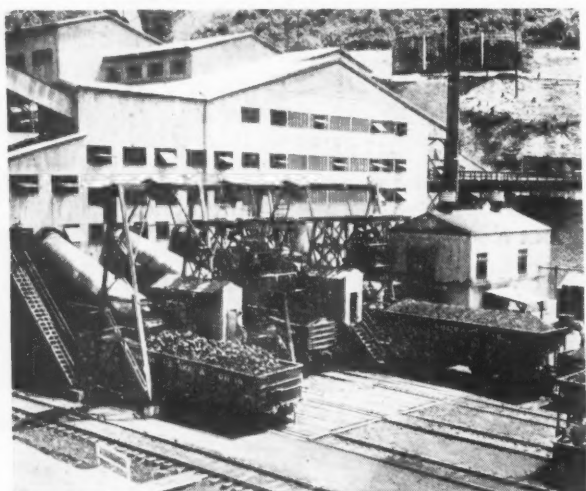
**GROWING
WITH
COAL!**

No. 4...

CAR SUPPLY

(Postscript to No. 1 of this series)

- One factor favorably affecting the car supply on the C&O is that, in addition to receiving new cars, the percentage of present C&O cars needing repairs has been held to a minimum.
- On July 31, 1948, only 1.0% of the C&O hopper cars and 2.6% of the gondolas were in need of repairs.
- These percentages are as low or lower than any other major railroad.
- The No. 1 message of this series estimated that 1,753 new coal cars would be delivered during May and June. The actual number was 1,764. New C&O coal cars continue to be received at the rate of 40 to 50 per day.



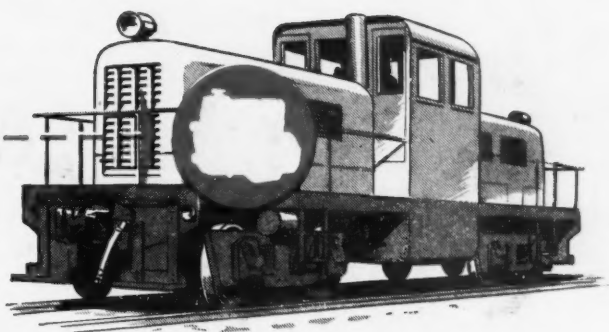
The importance of the car supply situation prompts us to add this postscript to the No. 1 advertisement of this series which discussed that subject. Narrowing the gap between the practical and the theoretical maximum of coal cars in service represents one of the factors which enables the Chesapeake and Ohio to keep pace with the growing coal industry in the distribution of cars to 348 active mines!



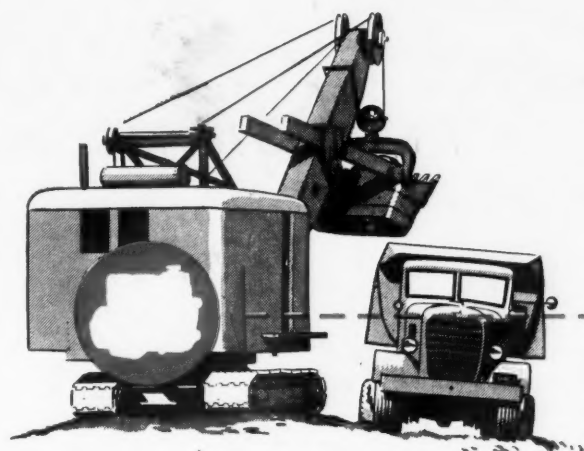
CHESAPEAKE & OHIO RAILWAY

Largest Originating Carrier of Bituminous Coal in the World

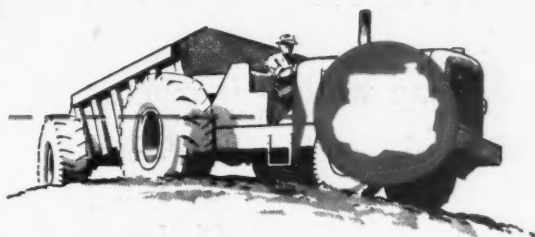
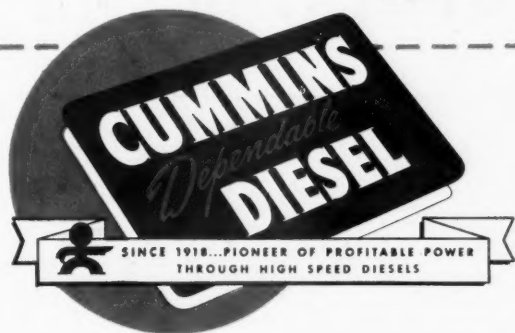
Watch this space



...and this space



...and this space



... for a new Cummins Diesel, built with the rugged simplicity of the famous "Model H" and designed to surpass its 15-year reputation for profit-making performance and economy.
This is the space to watch next month.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA

LOWER SURFACE MINING COSTS

with Tried and Tested
Earth-Moving Equipment

More and more miners are recovering coal by surface stripping — the modern, lower cost, safer way. Coal tonnage obtained by strip methods is now over four times higher than in 1936.

In keeping with their modern mining methods . . . many alert, cost-conscious strip-miners are using modern, powerful Allis-Chalmers tractors and motor graders . . . proved, widely used earth-moving equipment.

Modern mining with modern equipment means **BIG TONNAGE** at **LOWEST COST**.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U.S.A.



BIG VOLUME . . .



SMOOTHING THE WAY



FAST, LOW COST LOADING

Loading coal into trucks with this economical Allis-Chalmers HD-5 tractor and Tracto-Shovel saves money for the Theyer Coal Co., Hackett, Ark. Versatile, all-round, you can also use this outfit for loading any loose material and for excavating and loading dirt. Interchangeable attachments further widen its usefulness — available with bulldozer blade, snowplow, snow loader bucket, various sizes of material handling buckets and bucket teeth.



BADGETT MINE

Fleets of Allis-Chalmers Model HD-19 Hydraulic Torque Converter Tractors team-up with large capacity, 24 cu. yd. Gar Wood scrapers to strip huge volumes of yardage for Badgett

Mine Stripping Corp., Ky. The rugged and tough HD-19 — the **WORLD'S LARGEST TRACTOR** — outpulls and outperforms any tractor ever built.



G. H. YOXTHEIMER



HARMON CREEK COAL CO.

Building haul roads and keeping them smooth . . . cleaning coal beds . . . scarifying bony and clearing it from coal beds are some of the jobs of these powerful Allis-Chalmers Model AD Motor Graders for Manville Collieries Co. near Terre Haute, Ind. and G. H. Yoxtheimer, Northumberland, Pa. Another Allis-Chalmers

Motor Grader — the low cost W-Speed Patrol — is a popular outfit with miners for sweeping coal . . . besides being an especially economical machine for maintaining haul roads — shown cleaning a coal bed at the Apex mine for Harmon Creek Coal Co., Hopedale, Ohio.



NORTHERN ILLINOIS COAL CO.

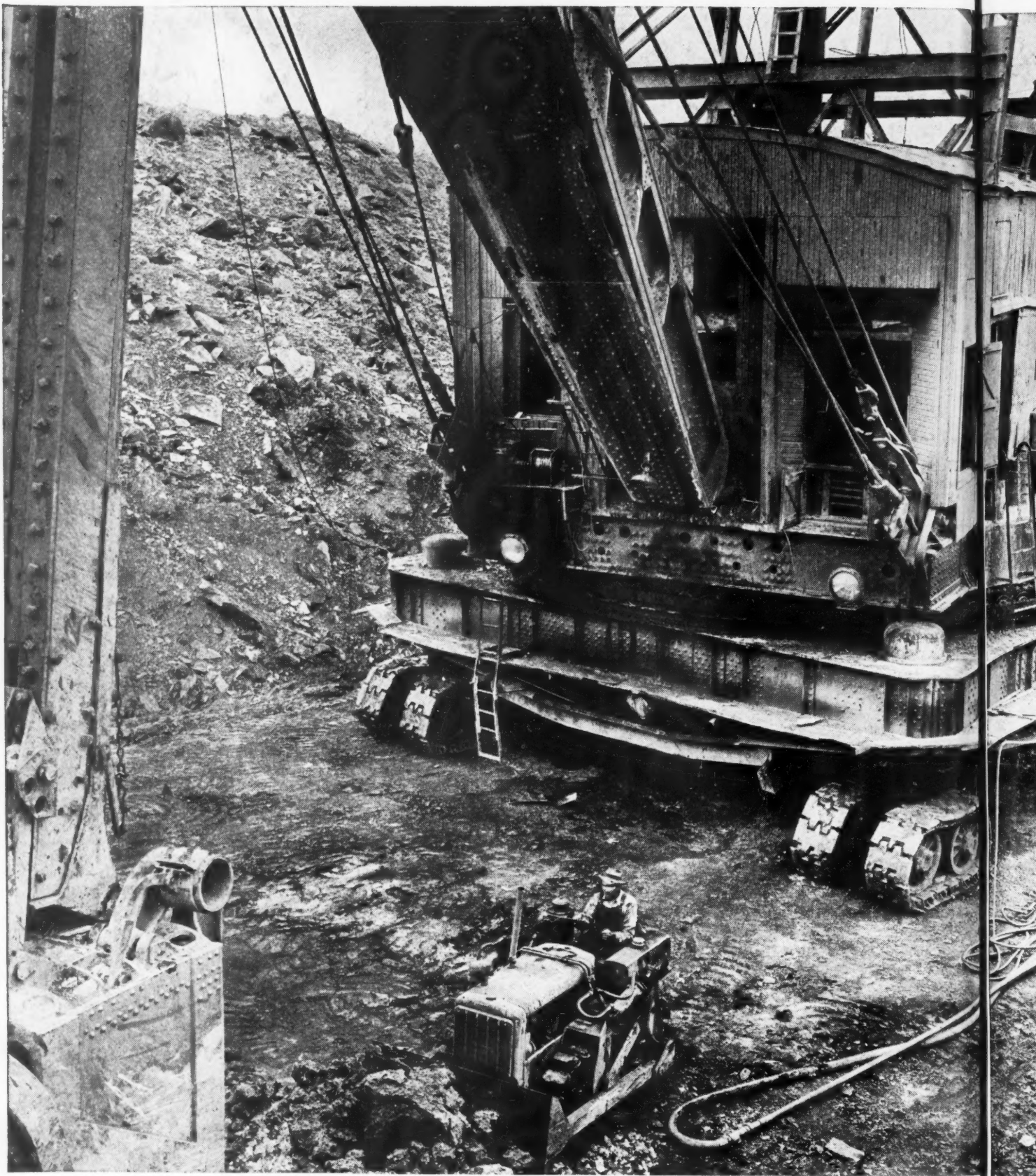


MAUMEE COLLIERIES

TEAM WORK Assisting big strippers, thereby keeping down stripping cost, are the main jobs of these fast-working, smooth-operating HD-19's for Maumee Collieries Co. at Jasonville, Ind., and Northern Illinois Coal Co., Coal City, Ill.

They clean up around the strippers and push material within reach . . . also level roadbeds for strippers . . . clean roadways for blast hole drills . . . build roads, strip hillside seams, level spoil banks and pull heavy equipment, among other jobs.

MODERN MINING WITH MODERN EQUIPMENT MEANS BIG TONNAGE AT LOWEST COST!



Tune in . . .
TEXACO STAR THEATER
 every Wednesday night
 featuring Gordon MacRae
 and
 Evelyn Knight . . .
 ABC Network.



TEXACO LUBRICANTS



STOP

COSTLY STOPPAGES

in hydraulic mechanisms

Use Texaco Regal Oils (R & O)

to prevent rust, sludge and foam

To make the hydraulic mechanisms in your shovels, dump trucks and other equipment operate more smoothly and efficiently — with far less servicing — use *Texaco Regal Oils (R & O)*.

Texaco Regal Oils (R & O) make ideal hydraulic mediums because they are turbine-grade oils — fully inhibited against rust and oxidation, and processed to prevent foaming. They keep hydraulic systems *clean* . . . prevent costly stoppages due to rust and sludge . . . extend the periods between necessary drainings.

There are suitable viscosities of *Texaco Regal Oils (R & O)* for every type and size of hydraulic

mechanism. Leading hydraulic equipment manufacturers recommend or approve *Texaco Regal Oils (R & O)* — many ship their units already charged with them.

A Texaco Lubrication Engineer will gladly assist you in improving the efficiency of your hydraulic mechanisms and all other machinery. Just call the nearest of the more than 2500 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, *National Sales Division, Dept. C*, 135 East 42nd Street, New York 17, N. Y.

TEXACO MAINTENANCE LUBRICATION CHARTS: Leading manufacturers of underground coal mining machinery approve Texaco lubricants for use on cutters, loaders, locomotives, etc., and have cooperated in preparing the charts. Charts show clearly where and when to use the proper Texaco lubricant. Order the charts you need by make and model of each machine.

For the Coal Mining Industry



Dependable Power HERE Means

Annual Savings in Mine Haulage

*In Mine Locomotives and Shuttle Cars
EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages*

- They are durable mechanically; grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They are foolproof electrically; are not injured by short-circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- They can be charged rapidly; do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- They withstand temperature extremes; are free from freezing hazard; are easily ventilated for rapid cooling.
- They can stand idle indefinitely without injury, without attention, and without expense.
- They are simple and easy to maintain.

Consistently low cost of operation—per year —per mile—per ton! That's what your records show when EDISON Nickel-Iron-Alkaline Storage Batteries power your mine locomotives and shuttle cars. These rugged batteries stay on the job, out of the repair shop, because:

The cells are built of sturdy steel to withstand rough usage; they contain an alkaline electrolyte which is a preservative of steel; their foolproof electrochemical principle prevents chemical deterioration.

EDISON Batteries can be charged in only six or seven hours during off-peak periods without equalizing, using current direct from the d-c supply through relatively inexpensive resistors, for they do not require critical adjustment of charge rates.

Protect your tonnage schedules—use EDISON for economy, efficiency and dependability.



EDISON
Nickel • Iron • Alkaline
STORAGE BATTERIES

EDISON STORAGE BATTERY DIVISION OF THOMAS A. EDISON, INC., WEST ORANGE, N. J.
In Canada: International Equipment Company, Ltd., Montreal and Toronto

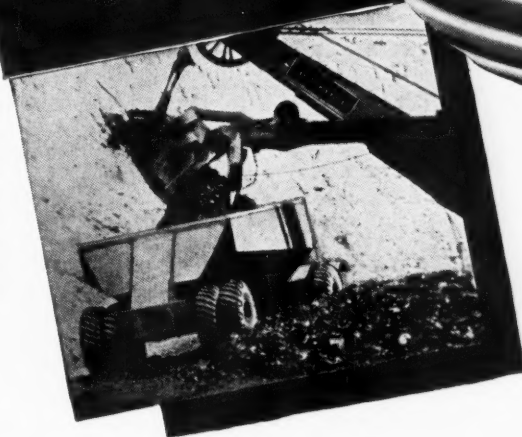
BUY and SPECIFY
GOODYEAR
— it pays!



**Two Tires
for
Mine and
Quarry
Service!**

ROAD LUG

Engineered for service both OFF and ON the road. It's bodied with tough, heat-resisting rayon cord for super strength and bruise resistance. Extra-heavy tread provides full resistance to cutting and snagging; has alternate long and short bars so it can dig in for traction and still roll long on highways.



HARD ROCK LUG

for off-the-road duty in body-bruising, tread-ripping service. Massive lug bars armor tread and sidewalls against cutting. Extra-thick undertread protects carcass from bruises. Super-strong rayon cord body adds more stamina and long life.

No ONE tire can deliver lowest cost per ton-mile on *EVERY* kind of mine and quarry haul.

That's why Goodyear builds these *two* great work tires — each a specially designed, special-purpose tire; the Hard Rock Lug for

off-the-road duty — the Road Lug for hauls both off AND on paved roads.

You'll find it pays to equip with Goodyear tires that are "right" for *your* needs. Check with your Goodyear man now for his recommendation.

Road Lug—T.M. The Goodyear Tire & Rubber Company

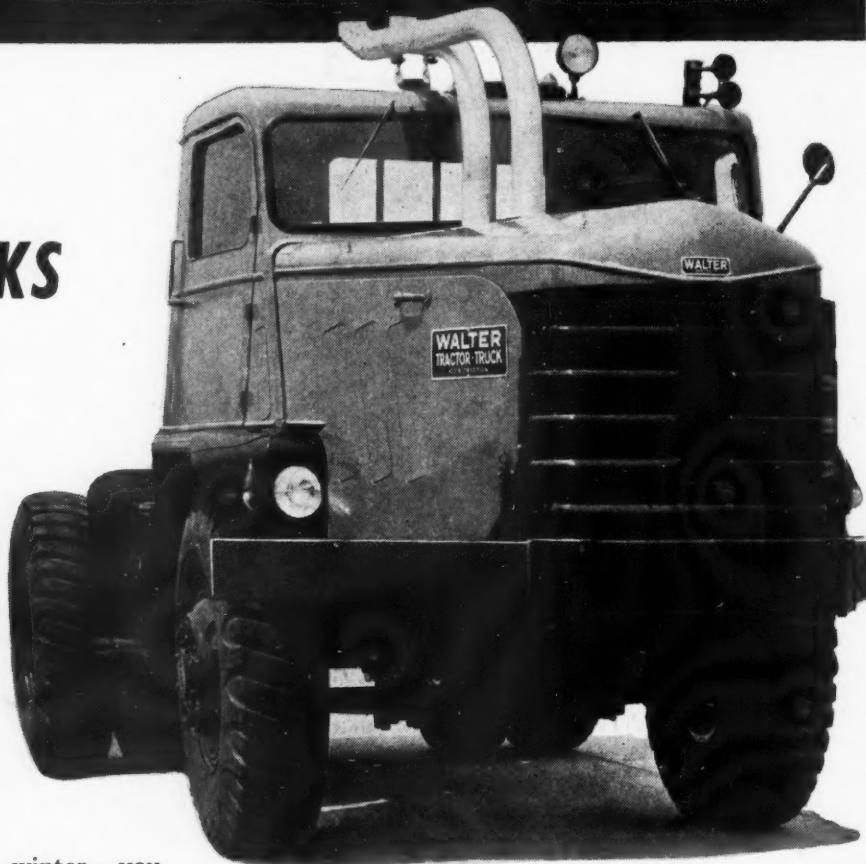
GOODYEAR



MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

NO "FAIR-WEATHER" FRIEND!

WALTER
TRACTOR TRUCKS
haul
big tonnage
in ANY weather
and
running conditions



SPRING, summer, fall and winter—you can go right on hauling capacity payloads of 20, 30 and 40 tons with Walter Tractor Trucks. Regardless of soft ground, mud, snow, slippery surfaces and grades . . . the unfailing four-wheel traction of Walter Tractor Trucks continues to pull.

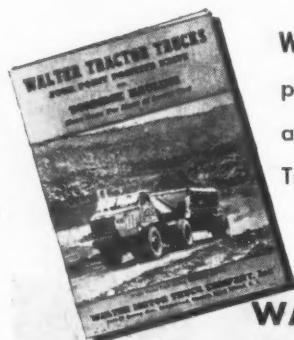
This is possible only with Walter Tractor Trucks because of the exclusive 4-Point Positive Drive, with three patented automatic locking differentials. Power is constantly and automatically concentrated on the wheels having the most traction at any instant. Steady tractive effort is available under all conditions.



● 300 hp. Walter Tractor Truck hauling 30 ton bottom dump trailer.



● 200 hp. Walter Tractor Truck with 20 ton back dump body.

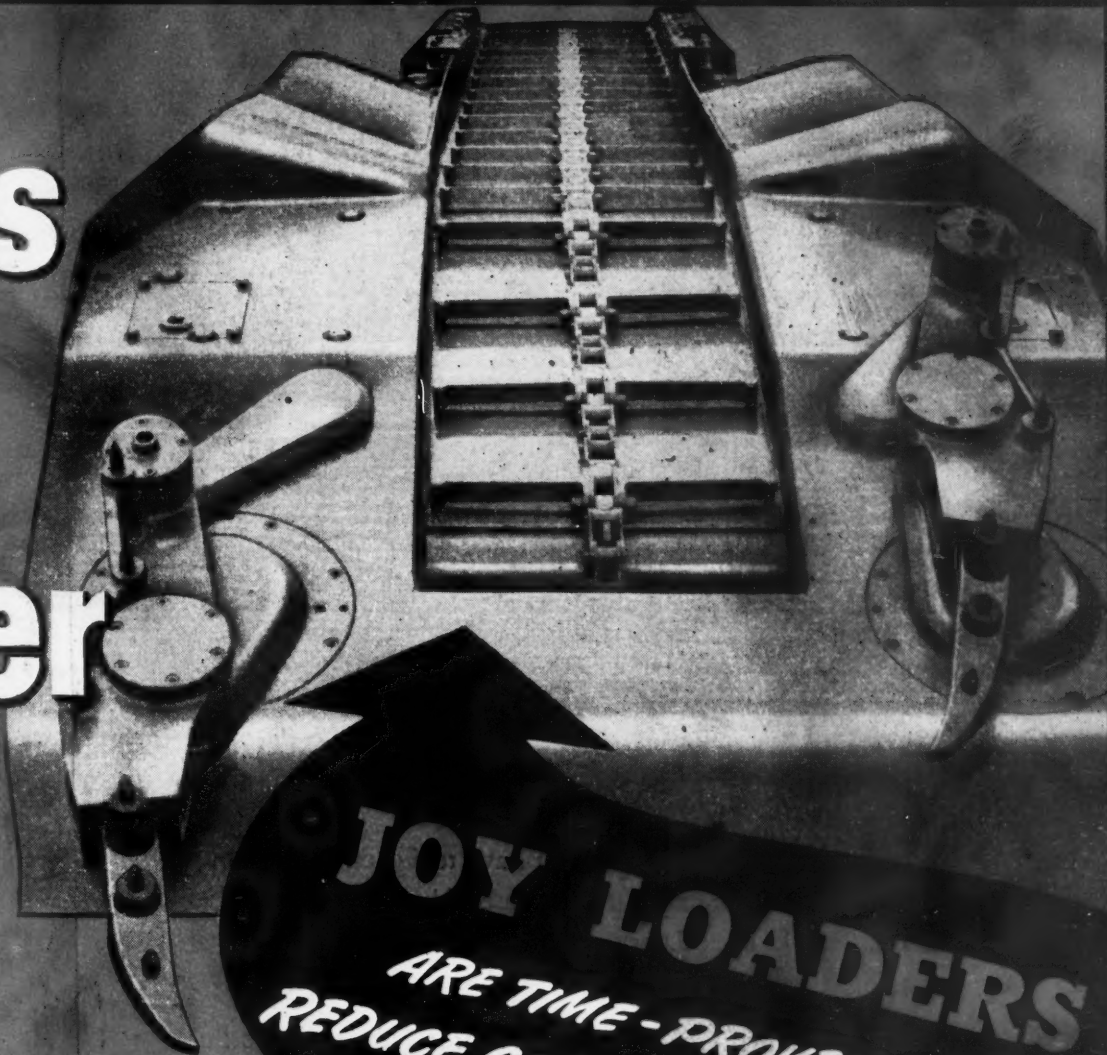


WRITE for detailed literature explaining this feature and other advantages of Walter Tractor Trucks for high tonnage hauling.

WALTER MOTOR TRUCK COMPANY
1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

WALTER TRACTOR TRUCKS

Loads Out Faster



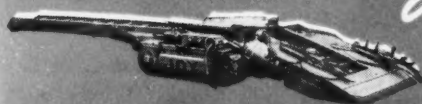
Left below, the tonnage producing 11-BU loading out in a high seam operation.

Right below, the 14-BU provides high capacity loading in low seams.

JOY LOADERS
ARE TIME-PROVED TO
REDUCE COAL HANDLING COSTS



There's a Joy Loader for Every Seam



12-BU for conveyor mining



14-BU 30 1/2", 33" and 36" high



11-BU 60" high

*Consult a
Joy
Engineer*



JOY DIVISION
JOY MANUFACTURING CO.

HENRY W. OLIVER BUILDING • PITTSBURGH, PA. U.S.A.

...help him load out greater tonnage

No longer do machine operators have to fight balky controls. No longer need tonnage suffer because of inefficient loader operation. Superla Mine Lubricants make possible faster and easier loading, these two ways:

Eliminate warm-up time. Superla Mine Lubricants are fluid at low temperatures. When the machine starts, controls operate freely, eliminating drag. Loading operation can be started immediately.

Prevent erratic operation. Superla Mine Lubricants keep clutch plates clean and permit smooth operation of controls. This allows easier handling of the machine, results in faster loading, and reduces operator fatigue.

These benefits brought by Superla Mine Lubricants have helped increase output of all types of loaders in many midwest mines. At the same time, the superior protection provided by these lubricants has reduced transmission maintenance costs as much as 50%.

You can put the means to increased tonnage at the fingertips of your machine operators—use Superla Mine Lubricants. A Standard Oil Lubrication Engineer will help you choose the correct grades for your equipment. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.



STANDARD OIL COMPANY (INDIANA)

SIX
an

No. 0.
tive. I
consum

No. 0.
a slight
and cu

No. 2.
gear c
provid

No. 4.

STA



Superla Mine Lubricants

SIX grades for lubricating any type of cutter or loader

No. 00. An oxidation-inhibited oil containing a detergent additive. It provides exceptionally clean operation and low oil consumption for oil-lubricated gear cases.

No. 0. A high-quality additive-type oil similar to No. 00 but of a slightly heavier grade. It is designed for Goodman loaders and cutters.

No. 2. A soft, semi-fluid grease for lubricating gathering-head gear cases where greater fluidity is desired than that usually provided by most loader greases.

No. 4. A semi-smooth grease particularly resistant to thinning

out under heat and mechanical working. At the same time it can easily be poured from the barrel bung at ordinary mine temperatures. It is especially designed for Joy loaders.

No. 6. A grease of heavy consistency and good high-temperature characteristics. Its fibrous structure makes it particularly useful on mine car wheels and for general underground lubrication.

No. 8. A smooth grease having superior high-temperature characteristics. It is suitable for armature bearings and pressure-gun work where a grease of heavy consistency is desired.

STANDARD OIL COMPANY (INDIANA)



It's the **SIDES** of a V-BELT That Really Get the WEAR!

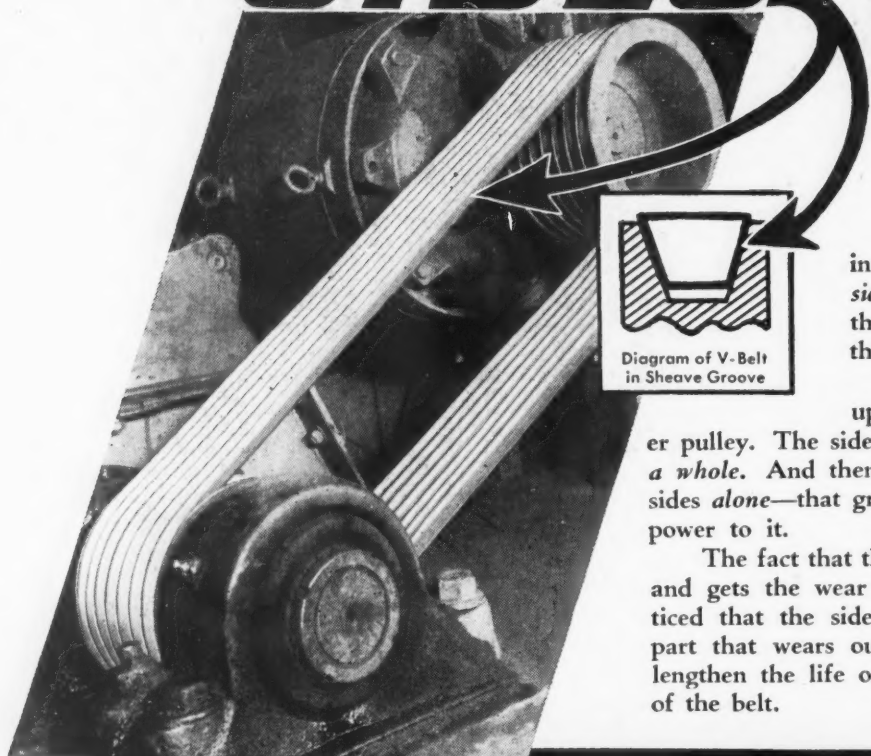


Diagram of V-Belt in Sheave Groove

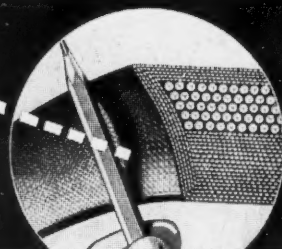
Look at this diagram of a V-Belt in its sheave. You see at once that the *sides* of the belt do all the gripping on the pulley and get all the wear against the sheave-groove wall.

It's the *sides*, moreover, that pick up all the power delivered by the driver pulley. The sides *transmit* that power to the belt *as a whole*. And then, once more, it's the sides—and the sides *alone*—that grip the driven pulley and *deliver* the power to it.

The fact that the *side* is the part that does the work and gets the wear explains why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that wears out *first*. Naturally, then, when you lengthen the life of the sidewall you lengthen the life of the belt.

Now See How the **CONCAVE SIDE** SAVES Sidewall Wear and Lengthens Belt Life!

U. S. PATENT NO. 1813698



The simple diagrams on the right show exactly why the ordinary, *straight-sided* V-Belt gets excessive wear along the *middle of the sides*. They show also why the **Concave Side** greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Saving Sidewall Wear is MORE IMPORTANT NOW Than Ever Before!

Now that Gates **SPECIALIZED** Research has resulted in Super Vulco Ropes capable of carrying much heavier loads—fully 40% higher horsepower ratings—the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important now than ever before!

THE GATES RUBBER COMPANY, DENVER, U.S.A.
489 "The World's Largest Makers of V-Belts"

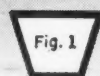


Fig. 1
Straight Sided V-Belt



Fig. 1-A
How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a Straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.



Fig. 2
Gates V-Belt with Concave Sidewall

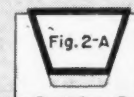


Fig. 2-A
Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt is Bending Over Pulley.

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

GATES VULCO ROPE DRIVES

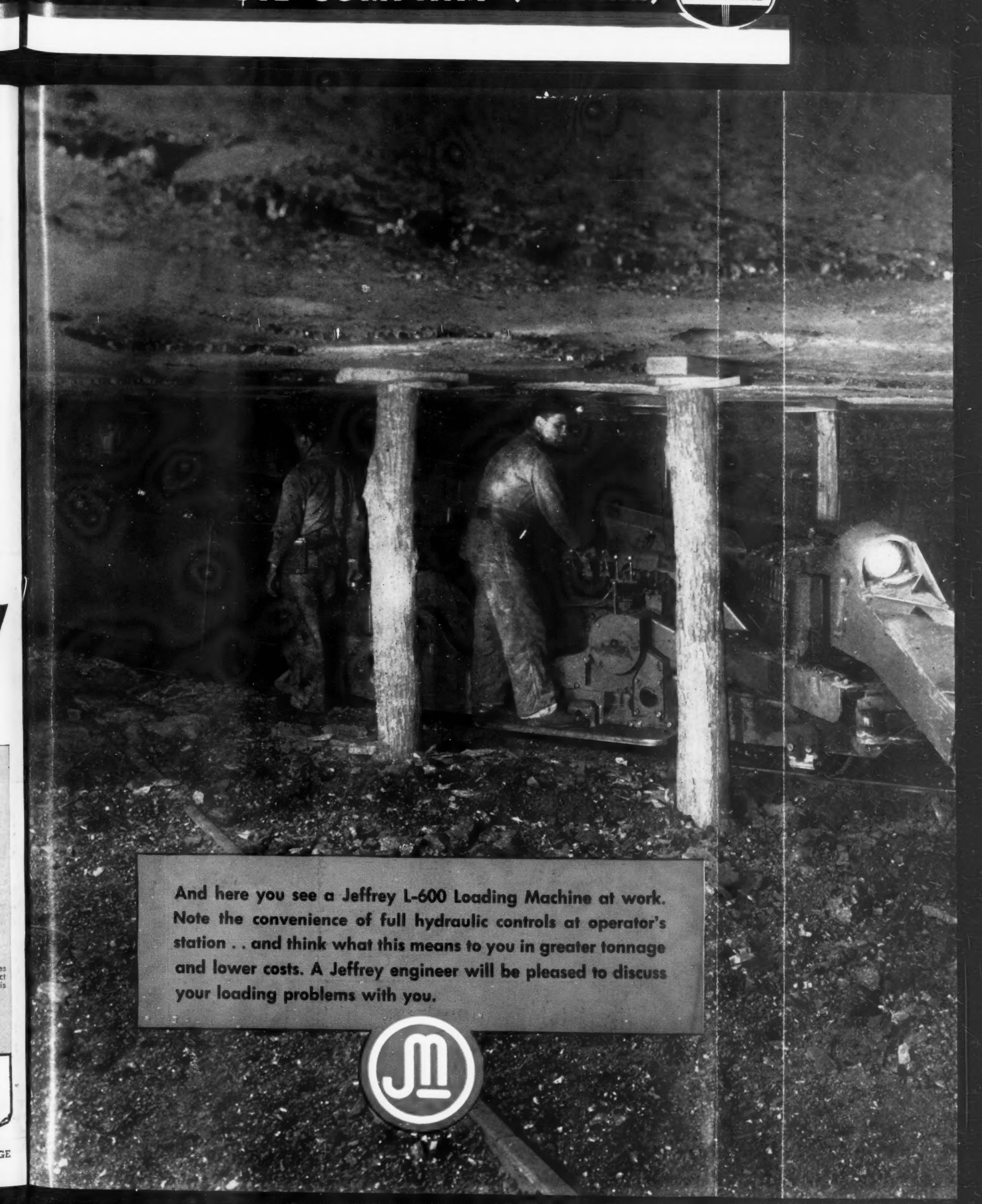
Engineering Offices and Jobber Stocks

IN ALL INDUSTRIAL CENTERS

of the U. S. and 71 Foreign Countries



The Mark of **SPECIALIZED** Research



And here you see a Jeffrey L-600 Loading Machine at work. Note the convenience of full hydraulic controls at operator's station . . . and think what this means to you in greater tonnage and lower costs. A Jeffrey engineer will be pleased to discuss your loading problems with you.





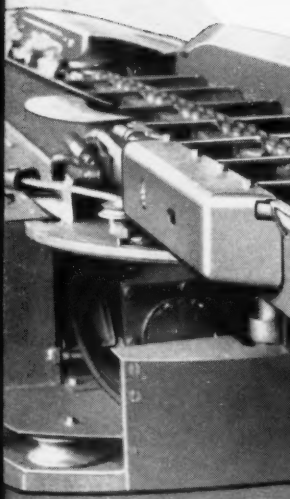
438-43



AN IM

COG I

PROD



**IMPORTANT
G IN MECHANICAL
DUCTION OF COAL**

JEFFREY L-600 LOADER

Ample capacity always available when needed . . "Down-Time" reduced to a minimum . . when a Jeffrey L-600 Loader is on the job. Designed and built to handle large tonnages, day after day, under all kinds of operating conditions, these big machines will provide exceptionally low-cost operation.

Finger-tip hydraulic control . . automatic cable reel . . high capacity for mines with seams ranging from three and one-half feet upward. The Jeffrey L-600 is particularly suited to room and pillar mining in panels, block system or other methods of pillar recovery.

Also loaders and conveyor-loaders specifically adapted to low seam operations; shuttle cars, underground conveyors and other necessary equipment (see page four) to speed production — lower cost per ton.

201-41

T

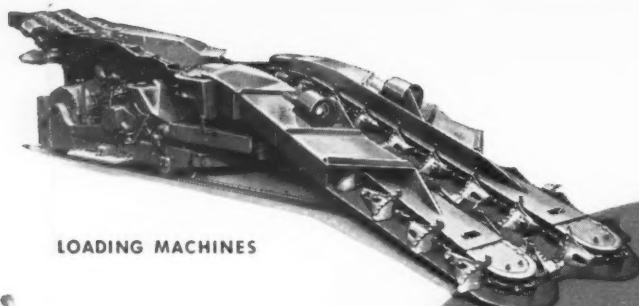
Sa

Se

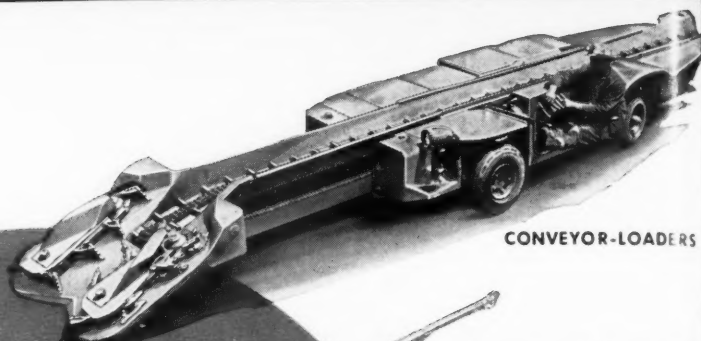
For

Y
ER

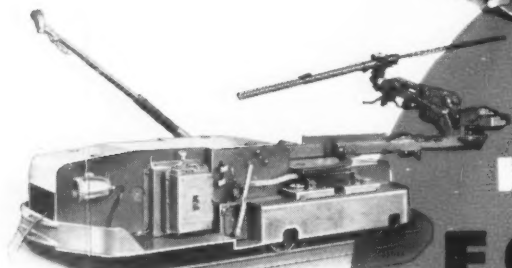
Down-
loader
nages,
these
ration.
eel . .
e and
suited
other
apted
veyors
speed



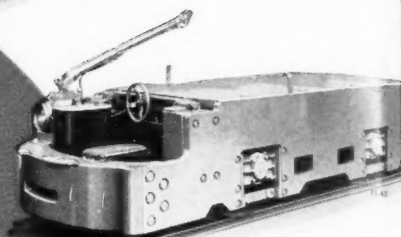
LOADING MACHINES



CONVEYOR-LOADERS

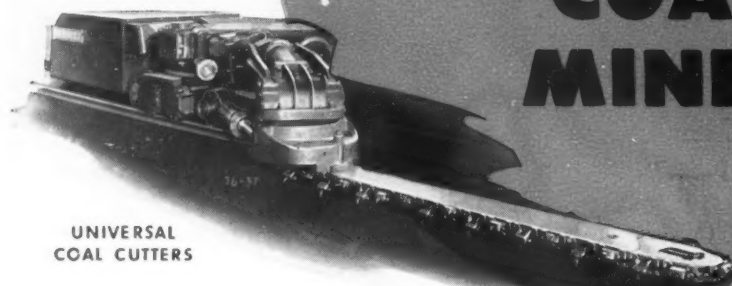


DRILLS AND
DRILLING MACHINES

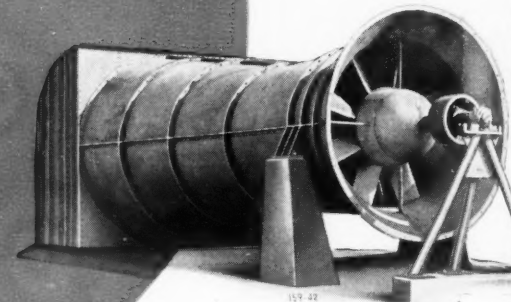


TROLLEY AND STORAGE
BATTERY LOCOMOTIVES

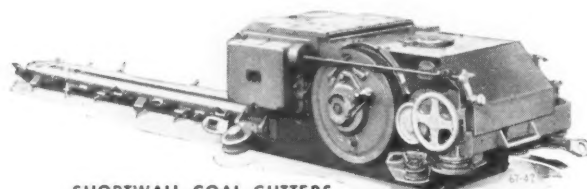
JEFFREY EQUIPMENT FOR COAL MINES



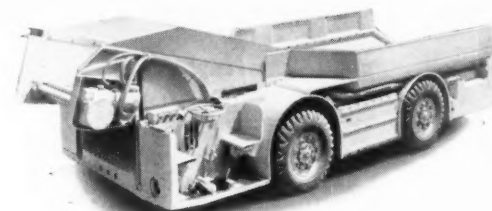
UNIVERSAL
COAL CUTTERS



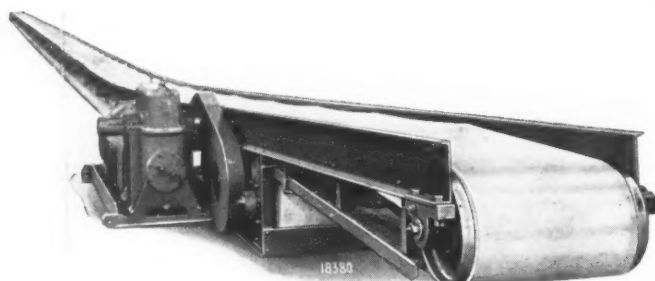
FANS AND BLOWERS



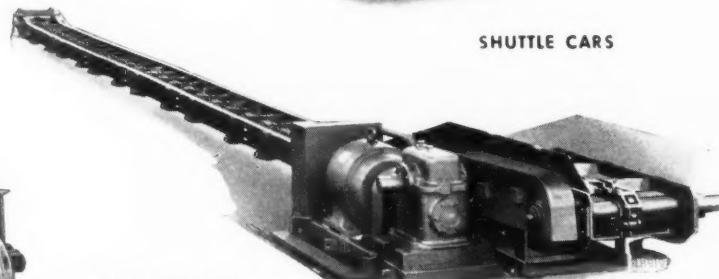
SHORTWALL COAL CUTTERS



SHUTTLE CARS



CHAIN AND BELT
TYPE CONVEYORS



AND GENUINE RENEWAL PARTS

THE JEFFREY MANUFACTURING COMPANY

Established in 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

Sales Offices:

Baltimore
Birmingham
Boston
Buffalo

Chicago
Cleveland
Cincinnati
Detroit

Denver
Harlan
Houston
Huntington

Jacksonville
Milwaukee
New York
Philadelphia

Pittsburgh
Scranton
St. Louis
Salt Lake City

Service Stations:

Pittsburgh
Harlan, Ky.

Birmingham
Mt. Vernon, Ill.

Logan-Beckley
W. Va.

Scranton

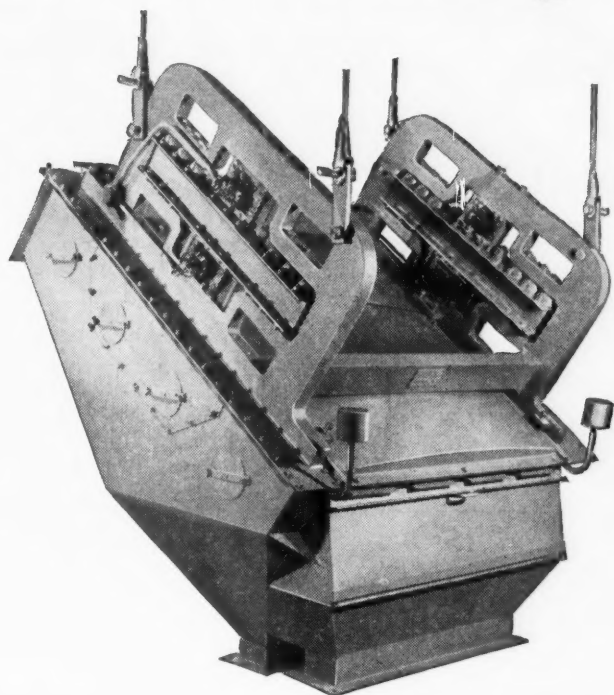
Foreign Plants:

Jeffrey Mfg. Co., Ltd.
Montreal, Quebec

British Jeffrey-Diamond Ltd.
Wakefield, England

Jeffrey-Galion (Pty), Ltd.
Johannesburg, S. A.

How to Get Improved Fine Screening...



1. Utah Electric Screen offers Five NEW Features

NEW rigid rubber-mounted steel vibrator bar replaces reed construction . . . results in more accurate control for fine sizing. NEW Vari-pulse non-blinding device periodically increases vibrating amplitude* to dislodge clogging near-size particles . . . permits operating screen at minimum amplitude setting without blinding.

A NEW power unit provides *finger-tip control* of amplitude. A NEW *wide range* of amplitude means increased screening versatility. And — a NEW dust enclosure has a quick-opening door that makes cloth inspection and replacement easy.

What's more — Utah screens are built with no bearings, no rotating, sliding or striking parts. *Nothing to lubricate* — minimum maintenance!

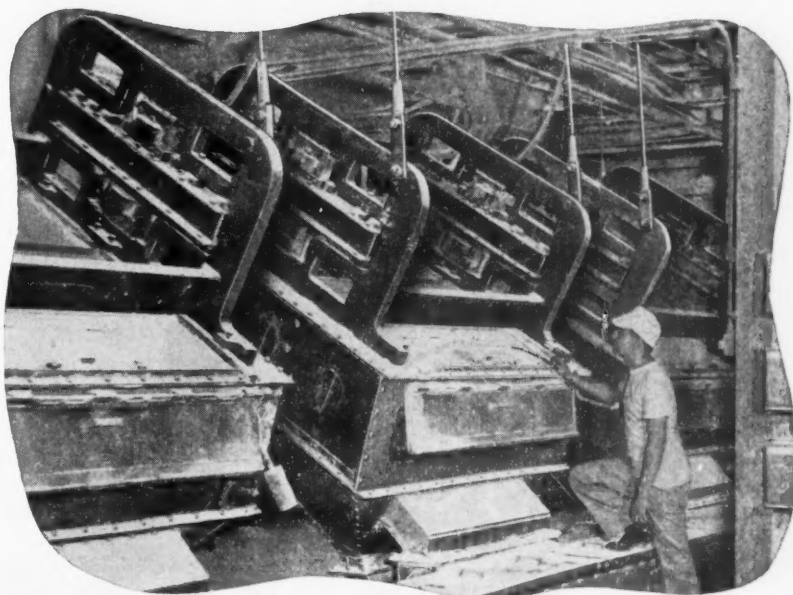
*AMPLITUDE: extent of vibratory motion; minimum to maximum distance of travel of screen deck.

2. Why All Five are Important to You!

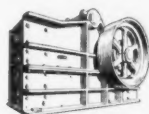
With this new non-blinding screen you can get *greatly improved* screening performance for a wide range of products of 10 to 45 mesh size. At right, for example, is a battery of Utah screens successfully handling soda ash in a large chemical plant.

The Utah electric vibrator operates at 3,600 vibrations per minute on 60 cycle current; 3,000 on 50 cycle; 1,500 vibrations on 25 cycle current. Wide amplitude range results in *better control* of the screening operation.

The Allis-Chalmers representative in your locality can explain how this screen can be used on your job. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2516



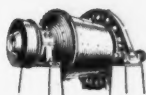
ALLIS-CHALMERS



Jaw Crushers



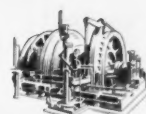
Gyratory Crushers



Mills



Kilns, Coolers and Dryers

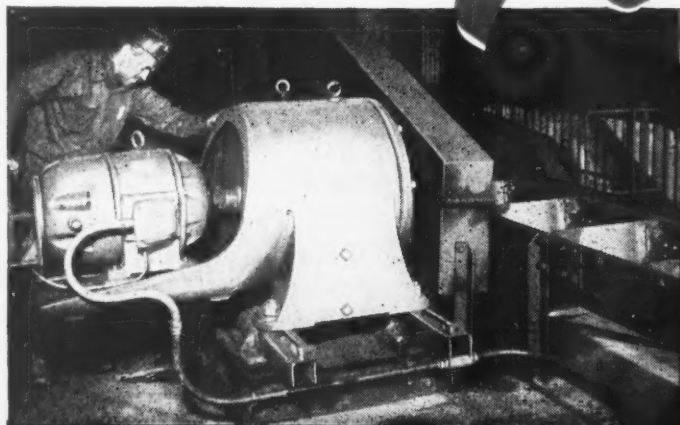


Hoists

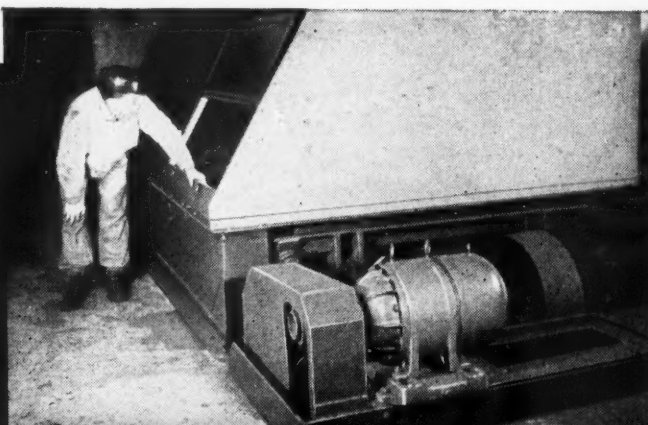


. . . and Other Equipment for the Crushing, Cement and Mining Industries

Availability for Service: 100%!



▲ Here a Tri-Clad totally enclosed, fan-cooled motor drives one of the plant's conveyors. Other G-E motors run washers, vibrators, sizing screens.



▲ Here a Tri-Clad motor drives an air table. G-E motors in this plant have operated constantly with little or no maintenance, since early 1946.

This load center unit substation is one of two 1500-kva G-E units which step down 6900-volt power to 480 volts. G-E substations are compact, ready-to-install.

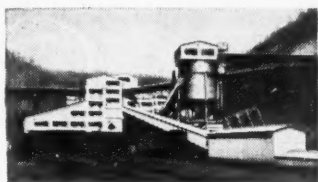


Equipment

...to cut coal-handling costs per ton!



In this ultra-modern colliery, G-E Tri-Clad motors work 90 hours per week, with practically no maintenance—power costs average only \$.021 per ton.



Two and a half years ago, the Dorrance Colliery of the West Virginia Coal and Coke Company was put in service as part of the Company's

multi-million dollar modernization program.

In choosing motors to drive the processing machinery—most of which is located in dusty atmospheres—the operators wanted maximum protection against corrosive effects and clogging action of dust and dirt, which can cause equipment shutdowns. That's why they selected General Electric totally enclosed, fan-cooled motors—more

than 90% of the 200 motors installed. These G-E motors—most of them of Tri-Clad* construction—have since run up a record of 100% service availability.

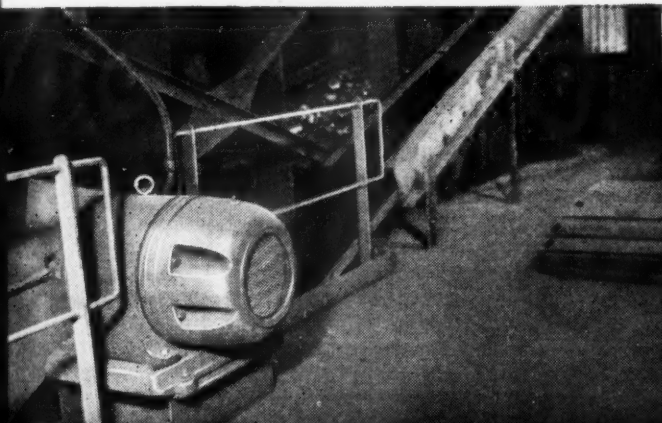
Also contributing to the colliery's high production are its modern G-E unit substations installed at strategic points to maintain operating continuity and assure full voltage at the motors.

For close co-ordination of the entire plant operation and for most efficient utilization of manpower, control of all motors is centralized in three G-E Cabinetrol* units.

As a result of the efficient use of electricity throughout the plant, the colliery handles 800 tons of R.O.M. coal per hour, and power costs have been kept down to only \$.021 per ton.

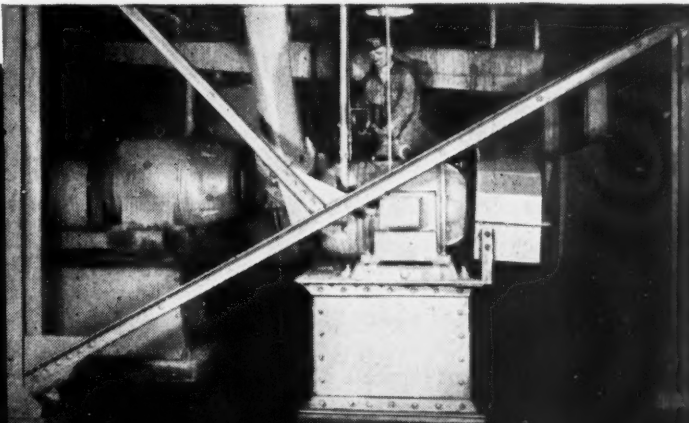
G-E engineers, thoroughly familiar with coal mining and preparation, can help you apply the properly co-ordinated electric equipment to cut your maintenance and power costs. As a first step, call the G-E office nearest you. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

**Reg. U.S. Pat. Off.*



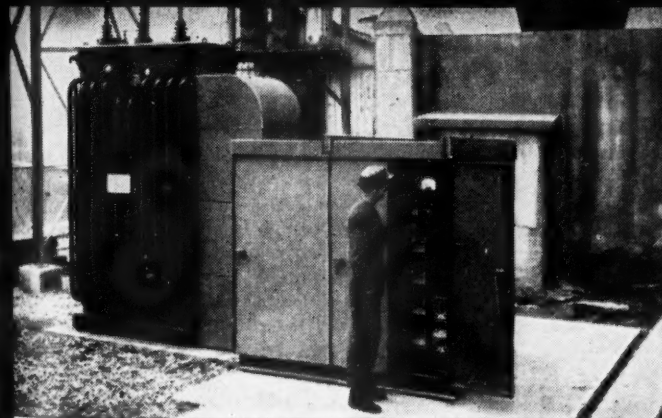
▲ Dust in the atmosphere around this shaker screen does not affect this Tri-Clad totally enclosed fan-cooled motor.

Here a 750-kva G-E unit substation, 6900-2400 volts, supplies power to a rotary converter in a drift mine as well as to an aerial tramway.



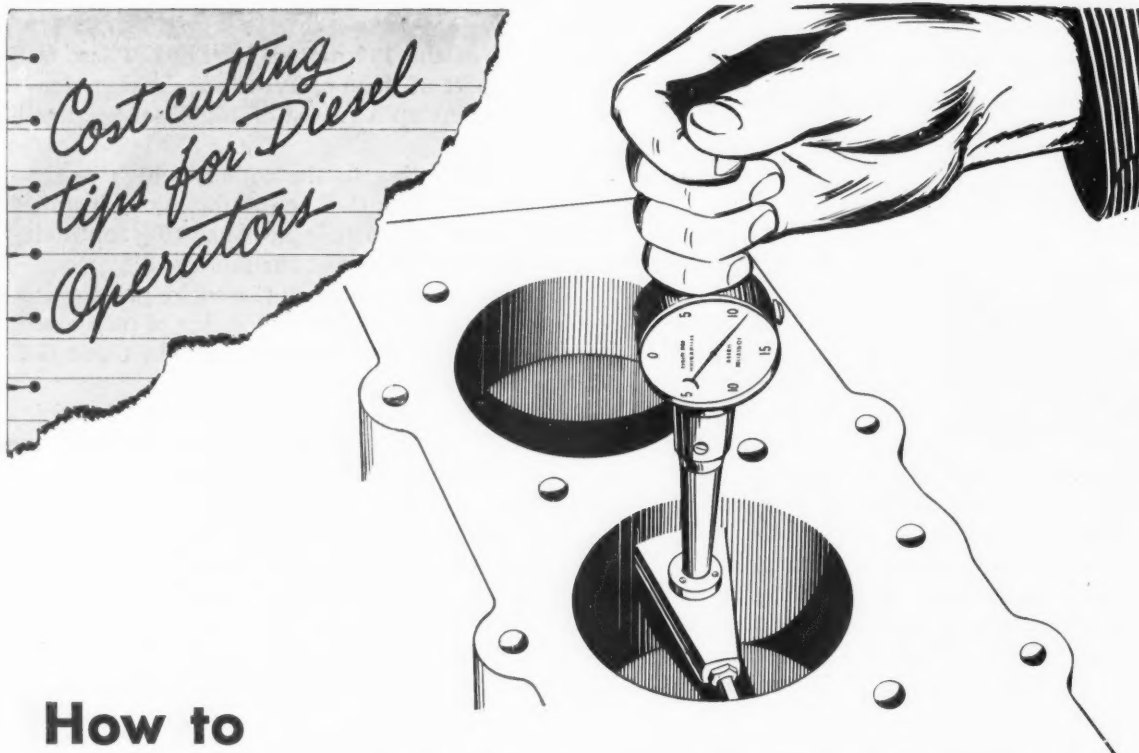
▲ Only routine inspection has been needed on this colliery's G-E motors since their installation. Shown are two Tri-Clad

This G-E Cabinetrol assembly is one of three master control sections in the plant. G-E metal-clad motor-starter units protect personnel, save installation time.



GENERAL ELECTRIC

667-90



How to guard against top cylinder wear

The liner is worn .011" near the top where cylinder temperature is highest because ordinary lube oil crept away from the hot spot, left it unprotected. Loss of power, high oil consumption and high blow-by naturally resulted.

To prevent tapered wear in cylinders use RPM DELO Diesel Engine Lubricating Oil. It contains a special metal-adhering compound to help it stick to sizzling upper cylinder walls. In actual laboratory tests RPM DELO Oil cut engine wear 30%.

CAUTION: There is no substitute for RPM DELO Oil. The formula for RPM DELO Diesel Engine Lubricating Oil has not been released to any other refiner for marketing under any other brand name or trademark.

Here are other special compounds that give diesels extra life, more efficiency:

1. **DETERGENT** gently removes carbon and varnish, keeps rings freer.
2. **OXIDATION-INHIBITOR** fights formation of gum and sludge, reduces oil slot, filter and air port clogging.
3. **FOAM-INHIBITOR** prevents crankcase foaming that can cause lost suction in sump pump, result in oil-starved bearings.
4. **CORROSION-INHIBITOR** makes RPM DELO Oil non-corrosive to all alloy bearings.

DISTRIBUTED BY
GORDON LUBRICATING COMPANY
In Pennsylvania, Ohio, West Virginia, Kentucky
Box 313, McKees Rocks, Pa. Phone Federal 3200

DISTRIBUTED BY
TRANSCENTRAL OIL CORPORATION
In Indiana, Illinois, Missouri, Michigan
600 S. Michigan Ave., Chicago, Ill., HAR. 2677 Indianapolis, Ind., Market 1401

PRODUCT OF THE CALIFORNIA OIL COMPANY



Ad. No. Misc. 68-R—P.O. No. S7-1502—3 cols. x 9 inches
California Oil Co.

Prepared by BBDO, San Francisco



Shuttle cars like the Joy 6-SC shown above are being used more and more in mechanized mining. Modern and efficient equipment, they deserve the best cables money can buy. The model illustrated gets its power through a two-conductor flat Twin Simplex-TIREX Cable.

Twisting, bending, stretching and runovers are only part of the daily abuse such cables must withstand. Such treatment is enough to make poorly designed trailing cables "give up the ghost" after what might seem to be a short service life. But not TIREX Cables. They are known throughout the coal mining areas for their staying qualities — for their ability to

take continual punishment and still come up with that extra service life that makes cost-conscious mines specify TIREX exclusively.

If cable costs are bothering you, why not specify Simplex-TIREX Cords and Cables with their wear-resistant cured-in-lead Selenium Neoprene Armor?

Simplex

WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.



ADD UP

**See for yourself how much money
O-B Automatic Couplers can save
in your own haulage operation . . .**

Far from being an additional expenditure, the purchase of O-B Automatic Couplers can actually save you money in the operation of your haulage system—money that can easily amortize part of the cost of your haulage equipment in addition to paying for the couplers themselves. For an understanding of the reasons why, study the six important cost-saving features discussed on these pages.

Since conditions vary from mine to mine, no attempt has been made to evaluate the savings of each feature. Only you, with your knowledge of your own operation,

can properly determine how much couplers will actually save you. In going over the six features, make an estimate of the amount each can save you annually. Add up the savings in the convenient check chart. See for yourself what an O-B Automatic Coupler operation can mean to you.

With today's labor-economic conditions, these savings become doubly important. Make it a point to investigate O-B Automatic Couplers before you purchase your next mine cars. Your O-B representative will be glad to discuss couplers with you in complete detail.



HOW MUCH CAN O-B COUPLERS SAVE YOU?

FILL IN YOUR ESTIMATED
YEARLY SAVINGS HERE

OPERATION

Labor at coupling points

Faster handling speeds

Less maintenance

Cleaning roadbed

More "payload"

Fewer cars required

Total yearly savings

Savings per ten-year period

\$

\$

\$

\$

\$

\$

\$

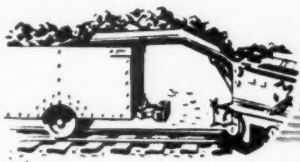
\$

THE SAVINGS!



LABOR AT COUPLING POINTS

Coupling is entirely an automatic operation. Two cars come together and couple without manual assistance. In some mines, the motorman alone can handle the cars at all loading and gathering points. In others, he can be assisted by one of the loading crew. One minute saved per car on 500 individual car handlings adds up to more than 8 hours per day. The same reasoning applies to car handling at shaft-bottom dumps and tippie switchbacks.



FASTER SPEED

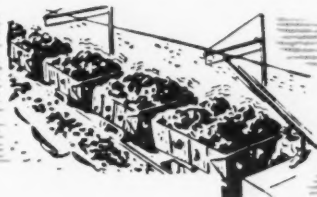
Coupler-equipped cars can be handled faster requiring less time per car-change under the loader. This utilizes the loader to better advantage and should enable your loading crew to produce more per man-hour.



LESS MAINTENANCE

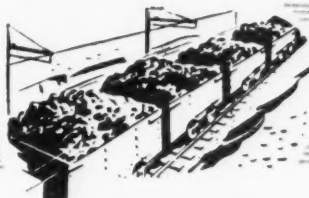
A sturdy rubber draft gear capable of absorbing impact blows up to 100,000 pounds (depending upon the type of coupler used) will eliminate a lot of wear and tear on

your cars. O-B Form-8 Couplers also impart added track stability to the car, keeping it on the track and preventing expensive derailments. Wheel flange wear is lessened.



CLEANER ROADBED

Cars equipped with old-fashioned links and pins bounce and jolt on their road to the tippie, often spilling considerable coal enroute. Mines using automatic couplers soon discover that cars ride more smoothly and spillage is eliminated. Estimate how long it takes to remove and recover this coal from your roadbed and multiply by the number of times this cleaning operation must be made each year.



MORE PAYLOAD

Because cars ride more smoothly, maximum carrying capacity of the car can be utilized. Often this amounts to 200 pounds or more of coal in each car.

FEWER CARS REQUIRED

Mines using automatic couplers usually find that fewer cars are required to haul the same daily tonnage. Coupler-equipped cars seem to get around quicker and make more round trips per day. A saving of ten percent on this item is not unlikely.

Ohio Brass

MANSFIELD, OHIO

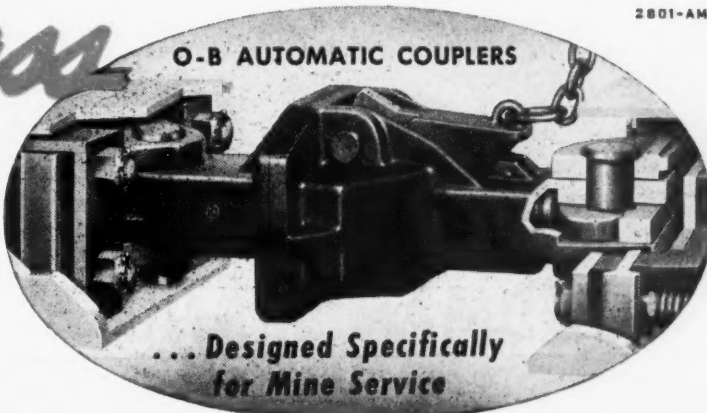
Canadian Ohio Brass Co., Ltd.,

Niagara Falls, Ontario



2801-AM

O-B AUTOMATIC COUPLERS



... Designed Specifically
for Mine Service

Seven Reasons Why You Should Investigate

THE GOODMAN



● INVESTMENT PAYS OFF—can be installed at low cost as a simple, efficient, productive system that can be proved out on a save-as-you-go program.

● BIG TONNAGES FROM CONCENTRATED AREAS—this plan of mining may be extended to large panels, supervision of work is closer, economy of operation greater.

● ROOM WORK IS SPEEDED UP—with an 8 foot cut, 40 foot rooms have been advanced as fast as 300 feet in 6 days, double shift, without change of set-up; face operations of cutting, drilling and loading are overlapped.

● NO ROLLING STOCK IN ROOMS—men are not endangered, timbers are not knocked down; no fast moving parts to break the coal.

GOODMAN MANUFACTURING COMPANY

DUCKBILL-SHAKER CONVEYOR

System of Mining



The Goodman Duckbill-Shaker has wide adaptability. It will operate profitably in coal heights lower than 30 inches and in higher seams as well.

Overlapping face operations accelerates tonnage. The Type 512 Short-wall equipped with Bugduster is an important member of the Goodman Duckbill-Shaker System.



- **LOADING CAPACITY IS HIGH**—with Duckbill-loader, fully automatic or power type, you get high effective loading time; no jockeying for position, operator can concentrate on productive loading; pan line is always full with a continuous flow of coal back to the room neck.

- **TOP TROUBLE IS MINIMIZED**—rooms are worked out before roof deteriorates to danger point; timbering is no handicap to profitable loading and transporting with Duckbill-Shaker Conveyor.

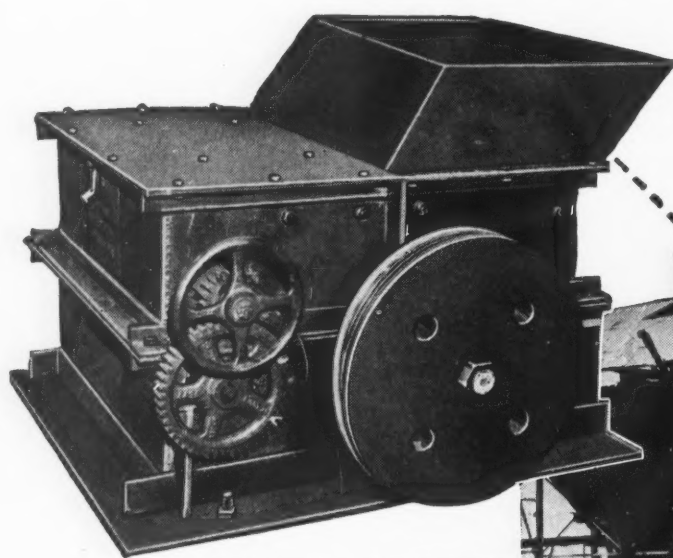
- **LOW COST PER TON**—simplicity and ruggedness of construction result in low upkeep cost; continuity of production results in high tonnage per man.

Scores of installations featuring Duckbill-Shakers are in successful operation today. Our engineers will be glad to help work out a system that will be profitable to you. Your inquiry is welcomed.

HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

In England — U. S. Steel Companies, Ltd.

Meet current sizing demands without extensive plant alterations in stall



AMERICAN
Drop Cage
CRUSHERS



Illustration shows how the Perry Coal Company, at its St. Ellen Mine near O'Fallon, Illinois, gained adequate sizing flexibility without extensive alterations by installing an American Drop Cage Crusher under its nut coal bin.

To keep pace with today's changing conditions, mine preparation facilities must be able to adjust quickly and efficiently to rapidly fluctuating market needs. Operators throughout the country have found the answer to their need for *greater marketing flexibility* in installations of American Drop Cage Rolling Ring Crushers.

ECONOMICAL—AND PROFITABLE

New flexibility can be added to plants without extensive plant revision, and without disrupting production. Americans are designed to occupy the smallest possible area, with extremely low headroom requirements, assuring minimum installation costs. And—greater profits come

with the greater marketing flexibility, because Americans give high tonnage production and minimum undesirable fines.

QUICKER, MORE EFFICIENT SERVICE

With American Drop Cage Crushers installed under storage bins, coal can be sized and delivered into waiting trucks and cars—in one operation—promptly, efficiently. Where no sizing is needed, coal can by-pass the crusher.

Americans are available in types to fit *your* operation—with capacities from 50 to 500 TPH. Why not find out how they can help make your coal marketing a more flexible, more profitable operation?

Send for Bulletin on Coal Crushing Data and Crusher Specifications

American

PULVERIZER COMPANY

*Originators and Manufacturers of
Ring Crushers and Pulverizers*

1119 MACKLIND AVE.
ST. LOUIS 10, MO.



**"mine car repairs?
...practically ZERO"**

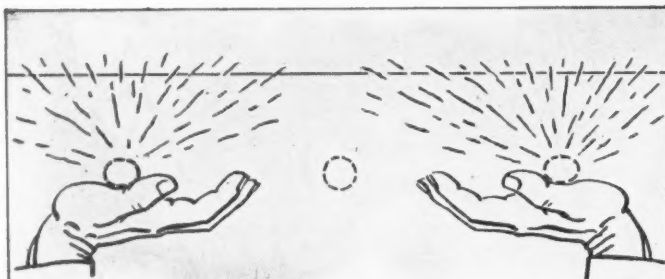
Call on your nearby A.C.f. Sales Representative for help on your transportation problems. American Car and Foundry Company
New York • Chicago • Cleveland • Washington
St. Louis • Philadelphia • Huntington, W. Va.
Berwick, Pa. • Pittsburgh • San Francisco

"These new A.C.f. cars are *rugged*! Take these two-way bumpers, now. Springs take the shock, whether the car's being pushed or pulled. That way, car rivets and welds don't take the hammering that tears 'em apart. These chilled-tread wheels keep the flats down to nothin' too. And they've even got *welded* end sills! They're just tough *all over*!"

A.C.f. MINE CARS
for Greater Coal Output

ROCKMASTER BLASTING Is Different!

First It Pushes



Beginning of one type of ROCKMASTER shot. The two outside holes "go" first, placing rock under tension and tending to open up any natural partings in rock and setting up shear planes between holes.

Then It Punches



Second part of ROCKMASTER shot comes milliseconds later, as center hole detonates, taking advantage of first part of blast and doing an unprecedented amount of work.

And What a Difference in Results!

1. More rock ready for the shovel.
2. Better fragmentation—less secondary blasting.
3. Far less "back-break" in quarries. Less pulverizing of coal in strip pits.
4. Minimum noise and vibration—even though more holes may be fired.
5. Wider spacing of drill holes can frequently be used, saving drilling costs and explosives costs.
6. Better control of "throw."

Rockmaster blasting is saving thousands of dollars with results like these in pits and quarries and on construction jobs—wherever it is applicable.

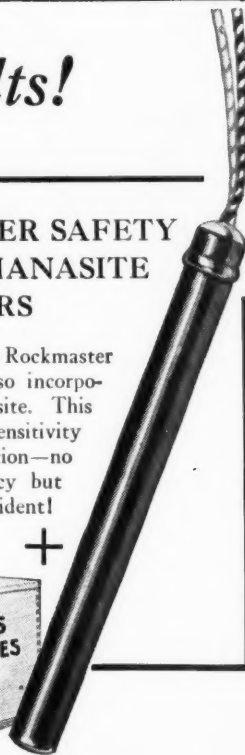
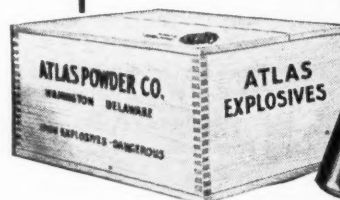
An original Atlas development—the Rockmaster system is tailor-made for each job. Choice of explosives, detonators, spacing and loading—all are considered for your individual requirements.

Call in the Atlas representative today. He will tell you frankly whether Rockmaster can get the same excellent results for you as it does for hundreds of others.

"ROCKMASTER"—Trade Mark
Manasite: Reg. U. S. Pat. Off.

THE GREATER SAFETY OF ATLAS MANASITE DETONATORS

Remember, the Atlas Rockmaster Blasting System also incorporates Atlas Manasite. This means decreased sensitivity to impact and friction—no sacrifice of efficiency but less chance of accident!

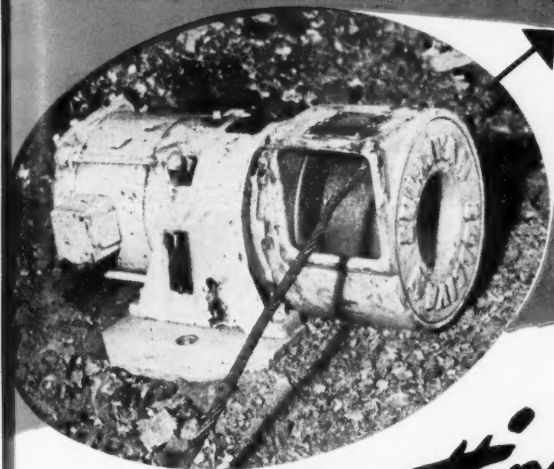


ATLAS

EXPLOSIVES
"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco



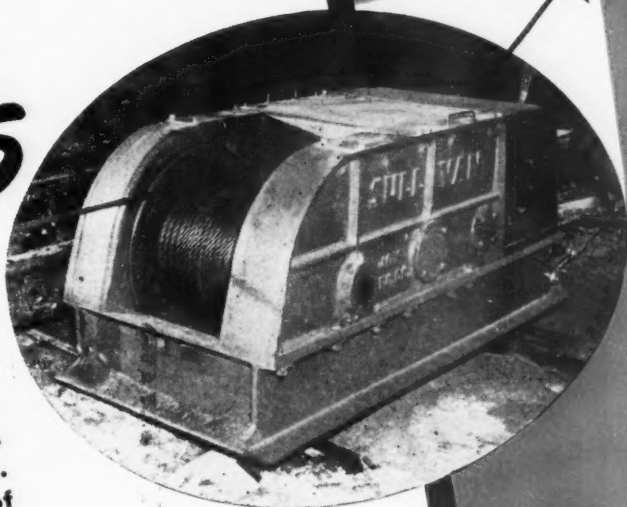
*Car Spotting handled
more Economically*

JOY

CAR PULLERS

slow speed, heavy duty pullers
that can be remotely controlled

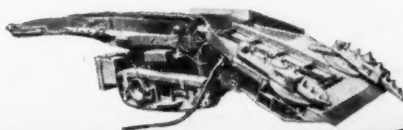
Powerful, precisely controlled pull. Low maintenance cost. All working parts are totally enclosed. Automatic motor-shaft brake holds cars on grades. Anti-back-lash brake prevents over-spinning of drum. The Joy RP rope puller (top) economically complements the car puller.



Remote
Control
Panel

JOY LOADERS

load more tonnage more quickly



Many models to suit individual requirements, high or low seams.



W&D CL

SULLIVAN DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

*Consult a
Joy
Engineer*

Versatile **KOEHRING 605**

With **DRAGLINE . . .**

There's always work for this big, versatile 605 around mines and quarries. As a dragline, it handles 1½ to 2½ cu. yd. buckets, depending on boom length and weight of material. Its big 37" power clutch, an exclusive Koehring feature, . . . retains feel of load . . . keeps operator and machine working at top efficiency all day. Fast, smooth swing, independent boom hoist, extra capacity, extra stability and heavy-duty strength get more work done. Quick, convenient convertibility to lift crane, clamshell, 1½-yard shovel and pull shovel extends the 605's big production capacity to all heavy mine and quarry work . . . assures steady earnings the year-around.



WORKS MORE DAYS PER YEAR . . . MAKES EACH DAY

Here's why . . .

Quick convertibility to dragline, lift crane, clamshell, shovel and pull shovel means more work days, no "off-season" hold-ups.

Big 37" power clutch cuts normal lever pull 90% . . . retains load feel . . . cuts operator fatigue, steps up output with every attachment.

Swing is smooth, because light spiders inside band clutches, not heavy drums, are accelerated . . . rotate cool-running finned drums.

KOEHRING

COMPANY

Milwaukee 10, Wisconsin
Subsidiaries: JOHNSON
PARSONS • KWIK-MIX

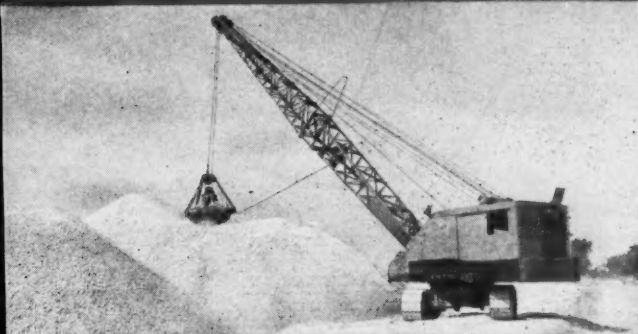


KEEPS BUSY YEAR-AROUND



With 1 1/2-YD. SHOVEL or PULL SHOVEL . . .

For your heaviest excavation, 605 with 1 1/2-yard dipper, has rugged rock boom of rigid welded box design, mounted on massive, shock-absorbing base . . . withstands torsional twists and strains of heavy-duty digging. Can also be used with 1 1/2-yard pull shovel during "off-season" for mine drainage . . . digs ditches 23' below tracks . . . up to 54" wide bite . . . 40 1/2' digging reach for wide work range.



With LIFT CRANE OR CLAMSHELL . . .

When not in use as an excavator, the big 605 with crane attachment handles heavy lifts up to 30 tons. Power-boom lowering available. Koehring 605 also provides you with high-speed clamshell operation for stockpiling and other bulk materials handling. There's no end to the jobs this all-modern, fully-convertible excavator can handle around your property. Speed in every operation gets work done.



DUMPTORS® . . . For balanced, high-production excavating and hauling, team up Koehring excavators with 6-yard Dumptors. You get: 3 speeds forward and reverse for fast, no-turn, shuttle haul . . . 6 h.p. per ton of gross vehicle weight for rough, off-road hauling . . . plenty of power to pull up grades to 24% fully loaded. Ask, too, about bigger, new 12-yard Koehring Rockter® for hauls over 3,000 yards.

MORE PRODUCTIVE

Moves, steers, stops, holds with positive traction-brake steering. Steers with turntable in any position. Result: extra maneuverability.

High-quality, heavy-duty construction . . . simple, accessible machinery . . . assure steady production daily, on every application.

Koehring Excavators are available in a complete range of sizes: 1/2-yd. 205, 3/4-yd. 304, 1 1/2-yd. 605, and new 2 1/2-yd. 1005. For complete facts see your Koehring distributor . . . or write to him for bulletins.

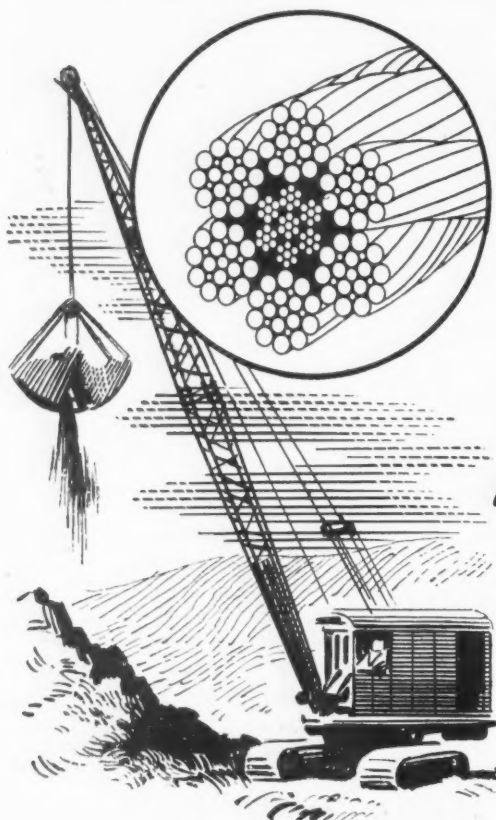
Y
nsin
ON
MIX



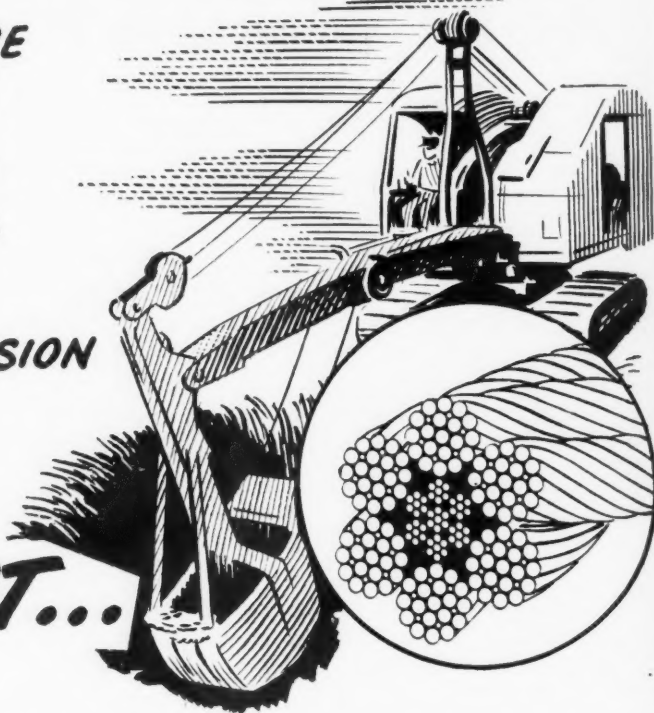
*Trademark Reg. U. S. Pat. Off. K826

SOME ROPES FOOL YOU

**U-W 6x19 LANG LAY FILLER WIRE
CONSTRUCTION (WITH I.W.R.C.)
IS GOOD FOR TRENCH HOES OR
BACK DIGGERS BECAUSE LANG
LAY CONSTRUCTION OFFERS
GREATER RESISTANCE TO ABRASION
AND BENDING FATIGUE**



BUT...



**FOR CLAM SHELL CRANES, U-W 6x19
REGULAR LAY FILLER WIRE
CONSTRUCTION (WITH I.W.R.C.) IS
BETTER BECAUSE IT IS MORE RESISTANT
TO CRUSHING AND DISTORTION
CAUSED BY HIGH RADIAL PRESSURE
AND MULTIPLE SHEAVE REEVING**

For longest and best service, always specify
U-W LAYRITE (Preformed) IMPROVED PLOW STEEL

UPSON-WALTON IS THE ONLY MANUFACTURER OF ALL 4...

Wire Rope, Tackle Blocks, Wire Rope Fittings, Brattice Cloth.

We invite you to let us engineer your problem jobs.

Copyright 1948—The Upson-Walton Company

THE UPSON-WALTON COMPANY

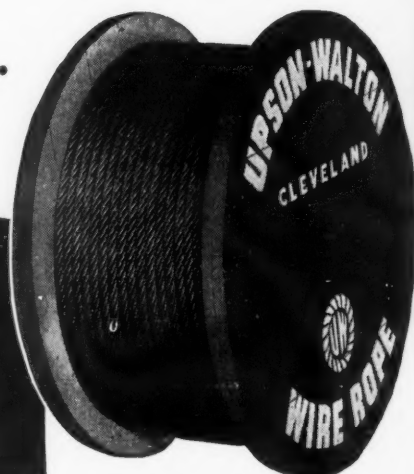
Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth

Main Offices and Factory: Cleveland 13, Ohio

114 Broad Street
New York 4

3525 West Grand Ave.
Chicago 51

241 Oliver Building
Pittsburgh 22



EATON *2-Speed*

Truck AXLES



Last Longer

**Because of Efficient
Planetary Construction**

The exclusive planetary system of the Eaton Axle is so designed that the planetary gears turn over in low ratio only. When the axle is in the high-speed range, the planetary pinions are held stationary and the axle operates as a conventional, single-reduction unit. As a result of this construction, wear is minimized and the life of the planetary gears is measurably increased. See your truck dealer for complete information about Eaton 2-Speed Truck Axles.

POWER WHEN YOU NEED IT—SPEED WHEN YOU WANT IT

EATON MANUFACTURING COMPANY

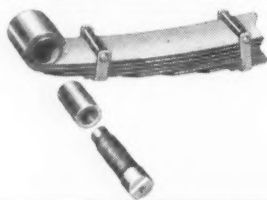
Axle Division

CLEVELAND, OHIO

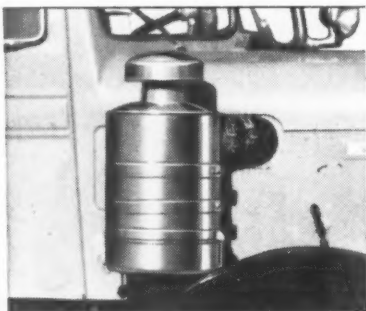
"A Dream to Drive"



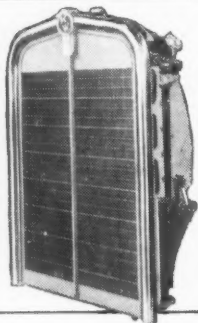
Kenworth's continuous full length cab door hinges withstand heavy duty service.



Kenworth front spring pins and bushings are threaded and made of hardened steel.



Air cleaners on Kenworth trucks are outside mounted for greater efficiency.



Better cooling is assured by Kenworth's tube and fin high-efficiency type radiators.



Did you ever swing on a star? Did you ever drive a Kenworth truck? If so, you'll know what we mean. If not, you've got a pleasant experience coming—because comfort for the driver has been designed into each Kenworth truck. Long, wide, flexible front springs assure a soft ride. Ventilation, seating, visibility, steering position, instrument and control layout have all been given special at-

tention. The comfort is made complete by the driver's secure knowledge that the Kenworth truck he operates is engineered for top performance and safety. Greater driver comfort and security are just two more reasons why *there's more WORTH in KENWORTH.*



KENWORTH

TRUCKS  BUSES

FACTORY AND HOME OFFICE: SEATTLE, U.S.A.
DISTRIBUTORS IN THE UNITED STATES AND MOST FOREIGN COUNTRIES

"

AL

IT ME
I sele
Contro
2)
— or p
factory
3)
lected
like to
Ho
located
nearby
ALLIS-

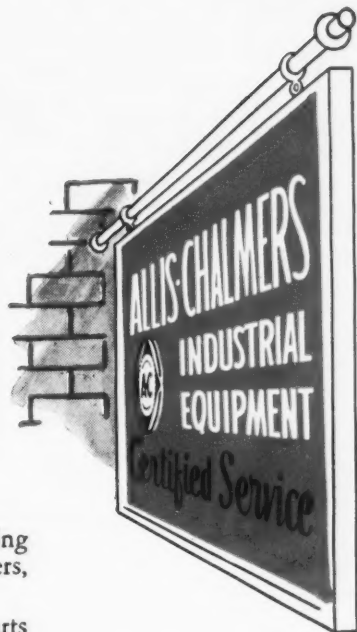
F



COAL

"Certified" Service

AN ADDED REASON FOR INVESTING IN ALLIS-CHALMERS MOTORS!



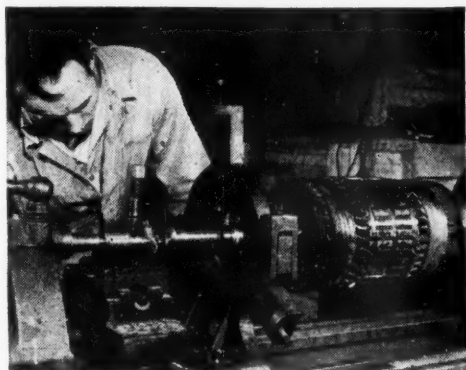
IT MEANS: 1) *Better, Faster Service.* Independent local repair shops are now being selected and authorized to service and repair Allis-Chalmers Motors, Transformers, Controls, Pumps — and "Certify" them as to workmanship.

2) *Finest Parts and Workmanship.* Shops use genuine Allis-Chalmers repair parts — or parts of equal quality; and are given complete service information, including factory procedure and drawings where necessary.

3) *Friendly Service.* Every Allis-Chalmers "Certified" Service Shop has been selected on the basis of its reputation in its community. It's the kind of company you like to do business with!

How can you get this service? For the present most "Certified" Service Shops are located in the larger U. S. industrial areas . . . but they're expanding rapidly. Call your nearby A-C District Office or Authorized Dealer for closest recommended shop. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

FINER, FASTER, FRIENDLIER SERVICE FOR INDUSTRY!



The A-C Supply Company of Cuyahoga Falls, Authorized Allis-Chalmers Dealer and newly-appointed "Certified" Service Shop, is staffed and equipped to give prompt, efficient, top-quality repair and service aid to customers in the greater Akron industrial area. Typical of the kind of "Certified" Service organizations being selected throughout U.S.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products



A 2506



The Governor of Nebraska *invites You*

VAL PETERSON
GOVERNOR



STATE of NEBRASKA
EXECUTIVE OFFICE
LINCOLN

To American Industry:

In the last decade, Nebraska's productive capacity has grown threefold. Modern industry has found in increasing numbers that Nebraska's diversified assets form the economic cornerstone of a better tomorrow!

Here there is respect and reward for individual initiative, whether its hallmark be overalls or a business suit. Nebraskans prize ingenuity, cooperation and achievement. Their fundamental faith is reflected by Nebraska government in a conscientious resolve against debt, restrictive taxes and regulatory legislation.

In behalf of all citizens, I invite industry to share Nebraska's unique heritage as the continental crossroads of commerce and heart of a land unmatched in natural wealth.

Sincerely,

Val Peterson
Governor



Val Peterson

* One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

*Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD
Road of the Daily Streamliners

Unfailing

EDISON LIGHT

aids
teamwork
underground

Photo courtesy U. S. Steel Corp.



The smooth operation of each group of workers underground is aided strongly by Edison Electric Cap Lamps. Brilliant, *unfailing* light, powered by the unique Edison nickel-iron-alkaline battery, enables each miner to do his work better—and more safely—at all times. May we arrange a practical demonstration for you?

EDISON ELECTRIC CAP LAMPS

M·S·A

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS PITTSBURGH 8, PA.

District Representatives in Principal Cities

In Canada

MINE SAFETY APPLIANCES COMPANY OF CANADA LIMITED

TORONTO . . . MONTREAL . . . CALGARY . . . WINNIPEG . . . VANCOUVER . . . NEW GLASGOW, N.S. .

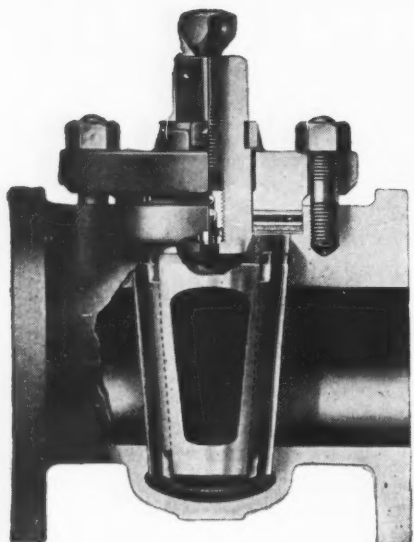
SOUTH AMERICAN HEADQUARTERS

MINE SAFETY APPLIANCES CO. (S.A.) (PTY) LTD.

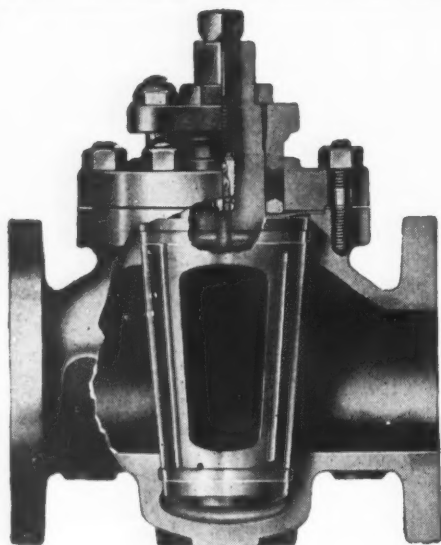
Casilla 733, Lima . . Agents in Principal Cities

Johannesburg, South Africa N'Dola—Northern Rhodesia

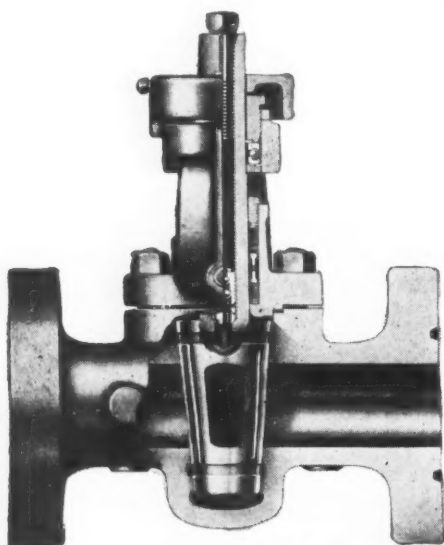




Single Gland Type



Regular Gland Type



Ball Bearing Type

FOR HANDLING

*Acids...
Solvents...
Sludges...*

**and other
troublesome liquids—**

USE WALWORTH LUBRICATED PLUG VALVES

When handling acids, condensates, dyes, oils, solvents, solutions, slurries and hundreds of similar "troublesome" liquids, you get better control, more dependable service and lower operating costs with Walworth Lubricated Plug Valves.

These valves have proved their ability to give easy operation . . . fast action . . . tight shut off . . . greater protection against corrosion. Turning is smooth and easy; just a $\frac{1}{4}$ turn from full-opening to full-closing. Moreover, Walworth Lubricated Plug Valves are tightly sealed against leaks — *whether open or shut.*

Walworth Lubricated Plug Valves are available in sizes $\frac{1}{2}$ " to 24" for pressures from 125 to 5,000 psi, and for vacuum requirement. For further information about Walworth's Complete Line of Lubricated Plug Valves, see your Walworth distributor or write for Catalog No. 46L.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

75% more WEARING SURFACE—

up to 90% MORE WEAR!

ROEFLAT aggregate wire screens

ALMOST ELEVEN MONTHS added *free* to every year of screen life...that's the extra dividend you get with ROEFLAT Aggregate Wire Screens! The new Roebling crimping method increases the flat wearing surface of screens by 75% . . . nearly doubles the wear . . . with no sacrifice of open area.

In addition, ROEFLAT'S level surface virtually eliminates blinding. Accurate size of openings gives you a uniform product and helps boost output. Importantly, too, improved quality steel adds greatly to the abrasion and fatigue resistance of all ROEFLAT screens.

ROEFLAT crimp is available in almost every type of wire screening. Write for Booklet W-903 giving full information.

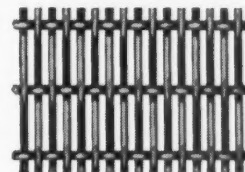
JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

TWO OTHER WAYS TO CUT SCREEN COSTS



ROESLOT



ROETON

★ WIRE ROPE AND STRAND ★ FITTINGS ★ SLINGS
★ SUSPENSION BRIDGES AND CABLES ★ AIRCORD,
AIRCORD TERMINALS AND AIR CONTROLS ★ AERIAL WIRE
ROPE SYSTEMS ★ ELECTRICAL WIRE AND CABLE
★ SKI LIFTS ★ HARD, ANNEALED OR TEMPERED
HIGH AND LOW CARBON FINE AND SPECIALTY WIRE,
FLAT WIRE, COLD ROLLED STRIP AND
COLD ROLLED SPRING STEEL ★ SCREEN, HARDWARE
AND INDUSTRIAL WIRE CLOTH ★ LAWN MOWERS

ROEBLING

A CENTURY OF CONFIDENCE



Peaker-Run Coal Co. us



Cleans coal — Tournadozer's soft rubber tires do not damage coal surface . . . make it ideal for cleaning coal . . . completes dozing cycle in 1/3 time it would take a slow-moving crawler.

Dozes a
controls
traction
here do



Travels anywhere — Tournadozer can travel or work anywhere . . . on loose spoil banks or hard-packed coal seams . . . on pavement or cross country . . . when needed for another job, hop on and go!

THE Peaker-Run Coal Company profitably used a 180 h.p. rubber-tired Tournadozer for a variety of jobs at its Oak Dale No. 3 mine at Penowa, Penn. Purchased primarily to aid stripping on 6 1/2 acres of 25' shale, sandstone and clay from 5' coal seam . . . Tournadozer also proved to be ideal for coal cleaning, snow and spillage clearing, shovel clean-up and for helping stalled trucks . . . licked the tough conditions of winter operation.

Superintendent likes its versatility

Abe Morelli, General Superintendent of the Peaker-Run Coal Company, states that Tournadozer does the work of a dozer for him and in addition

takes t
as a fe
piece o
and ve
road s

A 10-y
ator Bi
I've eve
roads .
its quic
operate
"It's a
help tr

Maintains roads — Backdragging blade, Tournadozer functions as grader in repairing a mine haul road . . . ability to get from one job to the next at 15 m.p.h. means more jobs completed in single day.

LETOURNEAL

PEORIA, ILLINOIS

IT'S RUBBER

HIGH-
SPEED
RUBBER
TIRES

THA

Uses **TOURNADOZER** TO:



- ★ Clean coal
- ★ Clear snow
- ★ Doze overburden
- ★ Maintain haul roads
- ★ Push stalled vehicles
- ★ Shovel clean up
- ★ Clear before stripping

Dozes overburden — Tournadozer's stability, instant controls, multiple-disc brakes, and sure four-wheel traction permits it to work close to edge of fill . . . here dozing overburden over edge of high wall.

takes the place of a road grader . . . plus serving as a feeder for a 1 3/4 yard shovel. "It's the best piece of dirtmoving equipment I've seen. It's fast and versatile . . . has less wearing parts and no road shock."

Operator likes its speed

A 10-year veteran with track-type tractors, operator Bill Stewart, says "It's the fastest method I've ever seen for cleaning coal . . . maintaining roads . . . I really like that fast acting blade . . . its quick control. Tournadozer's fast . . . easy to operate . . . easy to grease . . . easy to repair. "It's a good pusher, too . . . sometimes I use it to help trucks up our 20% grade haul roads and I

can run it over tar roads . . . through swamps . . . get there and get back in a hurry."

Ideal for any dozing job

Tournadozer meets the multiple demands of the Peaker-Run Coal Company and it will fill your need of a faster, more maneuverable rubber-tired dozer. Tournadozer can travel anywhere on pavement or cross country at speeds up to 15 m.p.h., forward and reverse . . . completes dozing cycles in 1/3 the time it takes a slow-moving crawler.

For complete information on this revolutionary high-speed Tournadozer, contact your local Distributor; or clip and mail this coupon TODAY!

R. G. LeTourneau, Inc., Peoria, Ill.

R. G. LeTOURNEAU, Inc., Peoria, Illinois

Please send information on the high-speed, rubber-tired Tournadozer.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

Type of business _____

Tournadozer-Trademark CM19

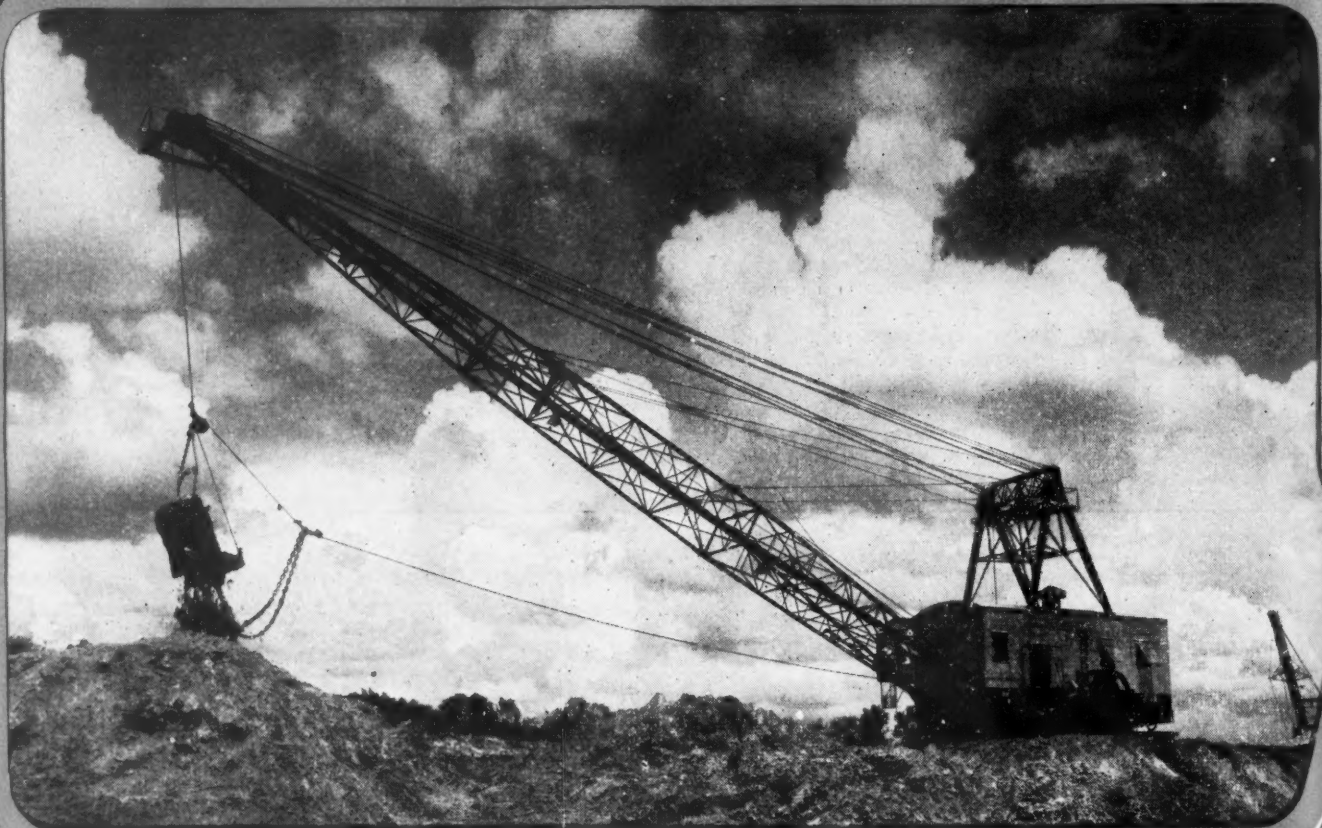


TOURNADOZERS

THAT PUTS THE ACTION IN TRACTION



Now! When You Order **D R**
Forge **Ev**



Tests Prove Service Life of Tuffy is Greater

"Wish to advise that the 'Tuffy' Drags which we said would go under 200,000 yds. went 432,371 yds. . . . this is the best average yardage we have ever had."

"This rope...gave 21 days service, which is over normal."

"This rope was installed April 16th and removed May 18th, a total of 27 days of service which is very good."

From all parts of the country, replies such as these verified the claims made by Union Wire Rope engineering specialists who designed Tuffy Draglines. In-the-field tests

were made under severe operating conditions where Tuffy handled many types of material on different equipment. Tuffy's extra flexibility, abrasive resistance and stamina were challenged in digging, casting, and loading operations. Yet results of the tests were the same in all cases: Longer Life, Better Performance, Greater Economy.

Tuffy is a special rope for any and all dragline jobs. It is designed by the same specialists who have made hundreds of other Union Wire Rope products the standard of quality in the construction field.



union
Wire Rope

Just

Tuffy
to get
job. I
end u
under
one s
desig
opera

A
(Exa
coupe

☐ Ser
Folder

For T
Union
(Liste
Telep
This C

DRAGLINES . . .

Everything Except

the **NAME Tuffy**

the **SIZE ?** inch

the **LENGTH ?** feet



Tuffy DRAGLINES

**are Built Tough to Meet all
Operating Conditions**

Extra flexibility and maximum abrasive resistance are built into Tuffy Draglines to assure dependable performance on any type of equipment—handling any type of material. Wet and dry dirt, sand, rock, gravel, cement, minerals, all give way to Tuffy's structurally tough construction. At high speeds or low speeds, Tuffy Draglines give top operating efficiency; they hold securely to drum when casting, ride better on grooves and are easier and safer to use. Put Tuffy to the test! He's built tough!

Just These 3 Specifications

Tuffy . . . Size . . . Length—that's all you order to get the RIGHT dragline for your particular job. No more confusing specifications, only to end up with a rope that is restricted to use under limited operating conditions. Now—in one simplified order—you get Tuffy Draglines designed to give maximum performance in *all* operations.

Always specify Tuffy when you order. (Example: 225' 1 1/4" "Tuffy" Dragline). Mail coupon today for illustrated folder.

UNION WIRE ROPE CORPORATION

2130 MANCHESTER AVENUE

KANSAS CITY 3, MO.

☐ Send Complete Illustrated Folder on Tuffy Draglines.

FIRM NAME

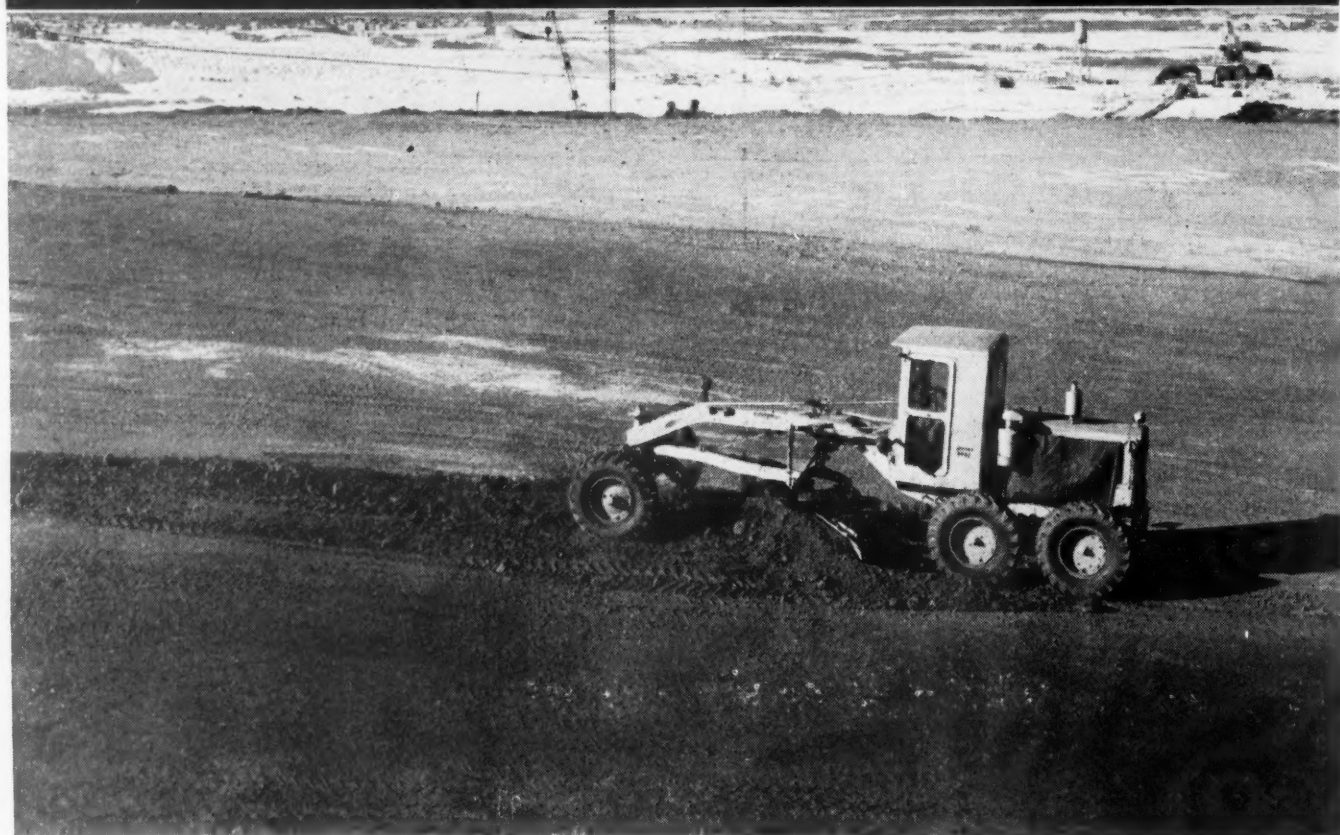
ADDRESS

CITY ZONE

STATE

For Tuffy Draglines — See Your Union Wire Rope Distributor (Listed in Yellow Section of Your Telephone Directory) and/or Send This Coupon.

Machine of many talents



MAINTEIN good operating conditions and you increase mine output substantially, say successful owners. Use the right equipment and you cut the cost of such maintenance.

"Caterpillar" Diesel Motor Graders are designed to do those very things. They build and maintain the smooth, well-drained haul roads so necessary for bringing giant loads from the pit. They keep the roads free of snow in winter. They level and grade the dump. They blade the last trace of overburden off the ore or coal so the loads will be clean and of high, uniform quality.

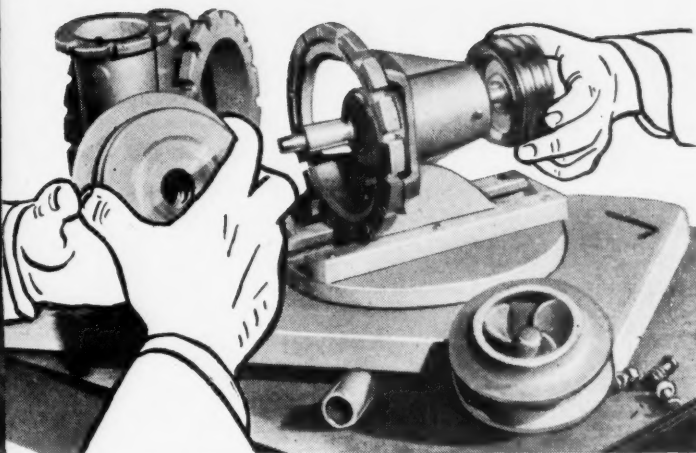
Watch one of these versatile machines in action and you'll quickly picture the many chores on which it can be "gainfully employed" on your particular operation. Note its unusual mechanical features . . . its full-revolving blade which permits the machine to work forwards or backwards (without turning around); its high reach which enables the blade to cut banks of the steepest slopes (right up to "perpendicular"); its down reach for deep ditch digging and cleaning. Finally, its sturdy build, plus its famous "Caterpillar" Diesel Engine, can promise you many thousands of dependable and profitable work hours.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

SOUTH AGNEW MINE, near Hibbing, Minnesota.
Picture shows a "Caterpillar" Diesel No. 12 Motor Grader keeping overburden dump in smooth haul-road condition. Also works around pit; plows and blades snow in winter. Owners, Butler Brothers, Cooley, Minn.

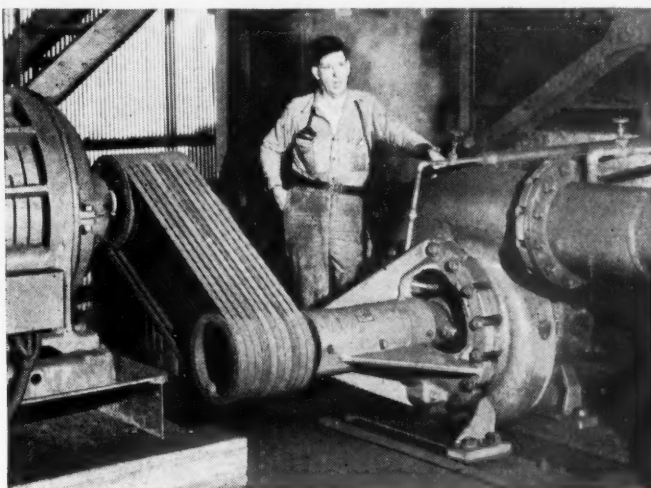
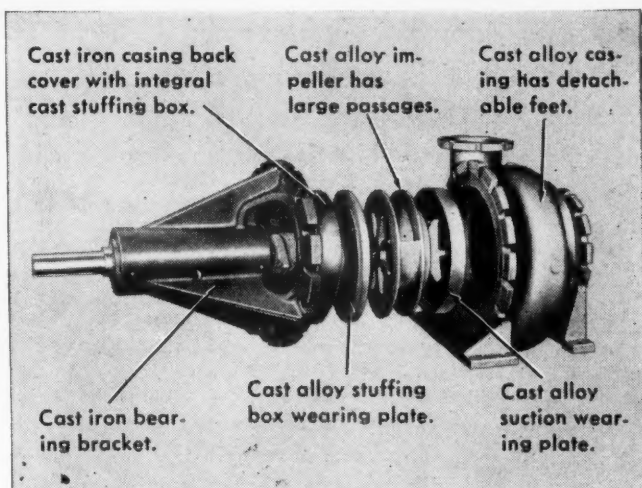
CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL
ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

See the Proof! Take this Model Solids Pump Apart Yourself!



1. See for yourself how easily . . . how quickly . . . you can disassemble this model Allis-Chalmers solids pump! For one thing, it has *only five* working parts—all easily accessible. And notice how pump design permits removing these parts *without disturbing the piping!*

2. Another thing—these pump parts are all standardized. This has meant substantial inventory savings for many CW pump owners. To change capacity you need only change the pump speed . . . no need to touch the impeller at all. Easy adjustment . . . easy maintenance.



3. Yes, you can actually *see* high efficiency design in every detail of this solids pump. Oversize shaft . . . casing and working parts made of Allisite, a special alloy for high abrasion resistance—these add up to a pump that will deliver *rated* capacity month after month!

4. You see, Allis-Chalmers designed this pump especially for coal. It's more than a sludge pump, it's a *coal washing pump!* Handles up to 40% solids in suspension successfully. Fits into cramped quarters. Variable discharge nozzle arrangement fits any installation set-up.

GET THE FACTS! The A-C representative in your locality will gladly arrange a desktop demonstration of model solids pump in your office. No obligation whatever. Clip the coupon NOW and mail direct to ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2442

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products



WRITE FOR FREE DEMONSTRATION

Allis-Chalmers Mfg. Co., Milwaukee 1, Wisconsin

☐ Yes, I would like to see this model solids pump in my office.

☐ Please send me Solids-Handling Pump Bulletin 08B6381B.

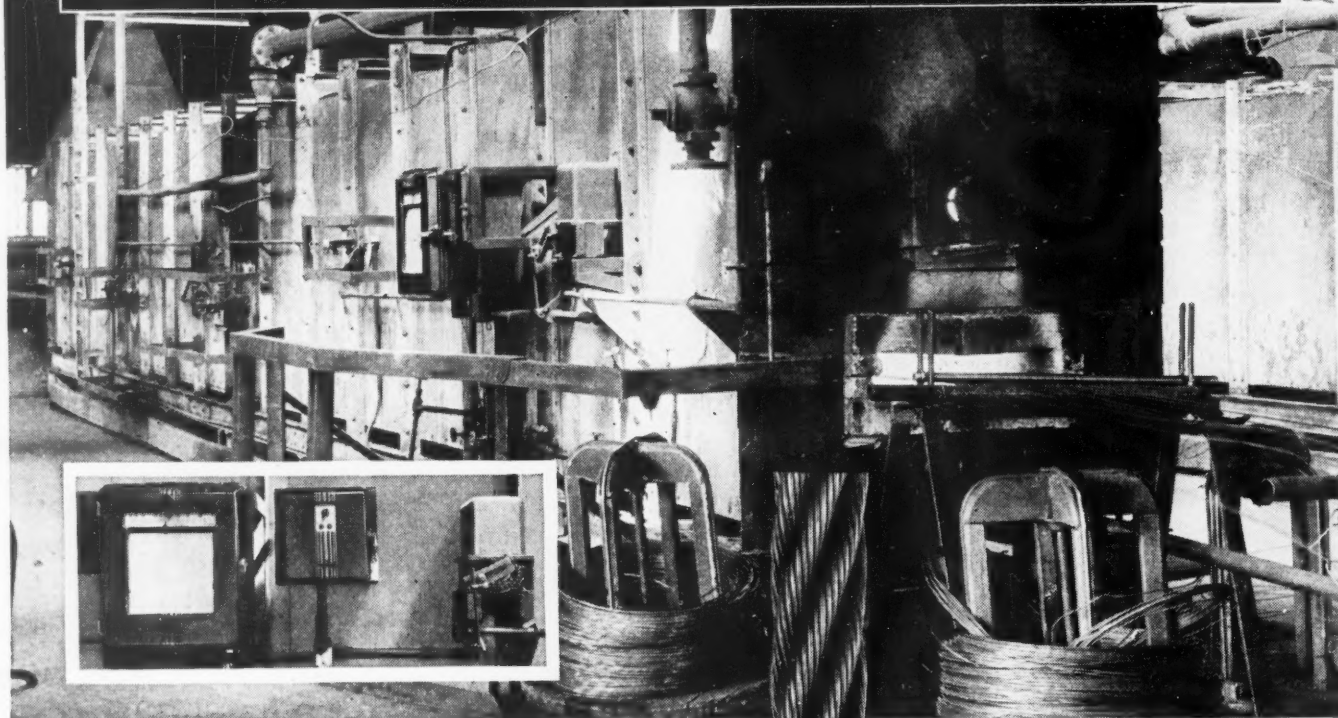
NAME

ADDRESS

FIRM

1234

Wickwire Rope Gets Tough When the Heat's On



Traveling through a fiery patenting furnace changes the microstructure of high carbon steel—removes the effect of cold drawing, permits further processing and makes rope wire exceedingly strong and tough.

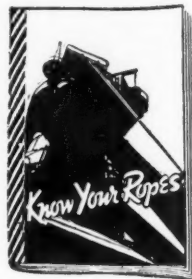
Temperature and rate of cooling have an important bearing on the size of grains developed in patenting, and grain size determines to a large degree, the physical properties of the wire. That's why the patenting furnaces at Wickwire's newly enlarged Rope Mill have controls so accurate that, even when operating at 1700°F., they anticipate a 5° drop or rise in temperature and automatically regulate the burners.

Accurate patenting temperature is one of many quality controls used in making Wickwire Rope. Because it contributes to rope strength and toughness, it is as important to you as the service of Wickwire distributors and rope engineers who are always ready to help solve your wire rope problems and to supply the right rope for your needs.

For the utmost in performance, safety and long life, specify Wickwire Rope. It is available in all sizes and constructions, both regular lay and WISSCOLAY *Preformed*.

THIS 82-PAGE BOOK
ON WIRE ROPE IS FREE

—WRITE FOR
YOUR COPY TODAY!



Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write: Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Massachusetts.

WICKWIRE ROPE

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass.

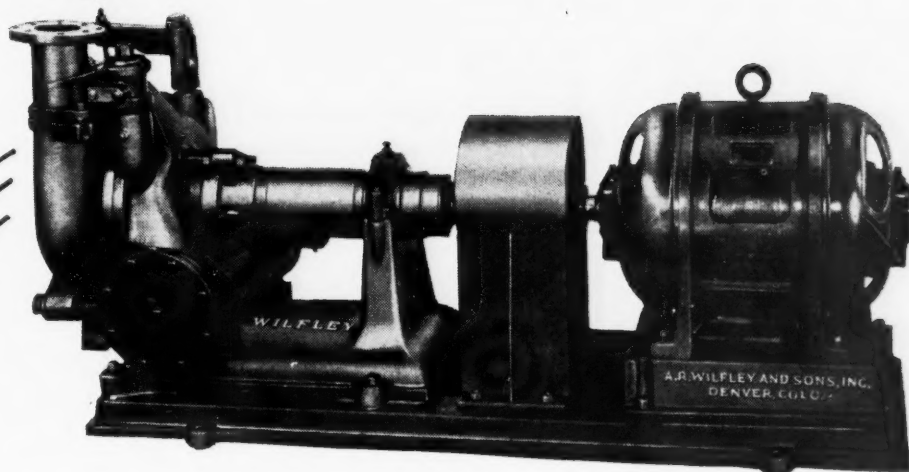
EXECUTIVE OFFICE—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Philadelphia • Tulsa • Fort Worth • Houston • New York
PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California



COST-SAVING . . .

Performance



Alert to ever-changing industrial demands, WILFLEY engineers carry on a continuous program of pioneering and research in the field. Exclusive features of design and construction, developed through practical, in-the-field experience, keep WILFLEY out in front...make it the pump to buy when cost-saving efficiency is the prime consideration. Heavy pumping parts of rubber, alloy iron, alloy steel... whatever material best suits your job. Individual engineering on every application. An economical pump-size for every purpose. Buy WILFLEY for dependable, cost-saving performance. Write or wire for complete details.

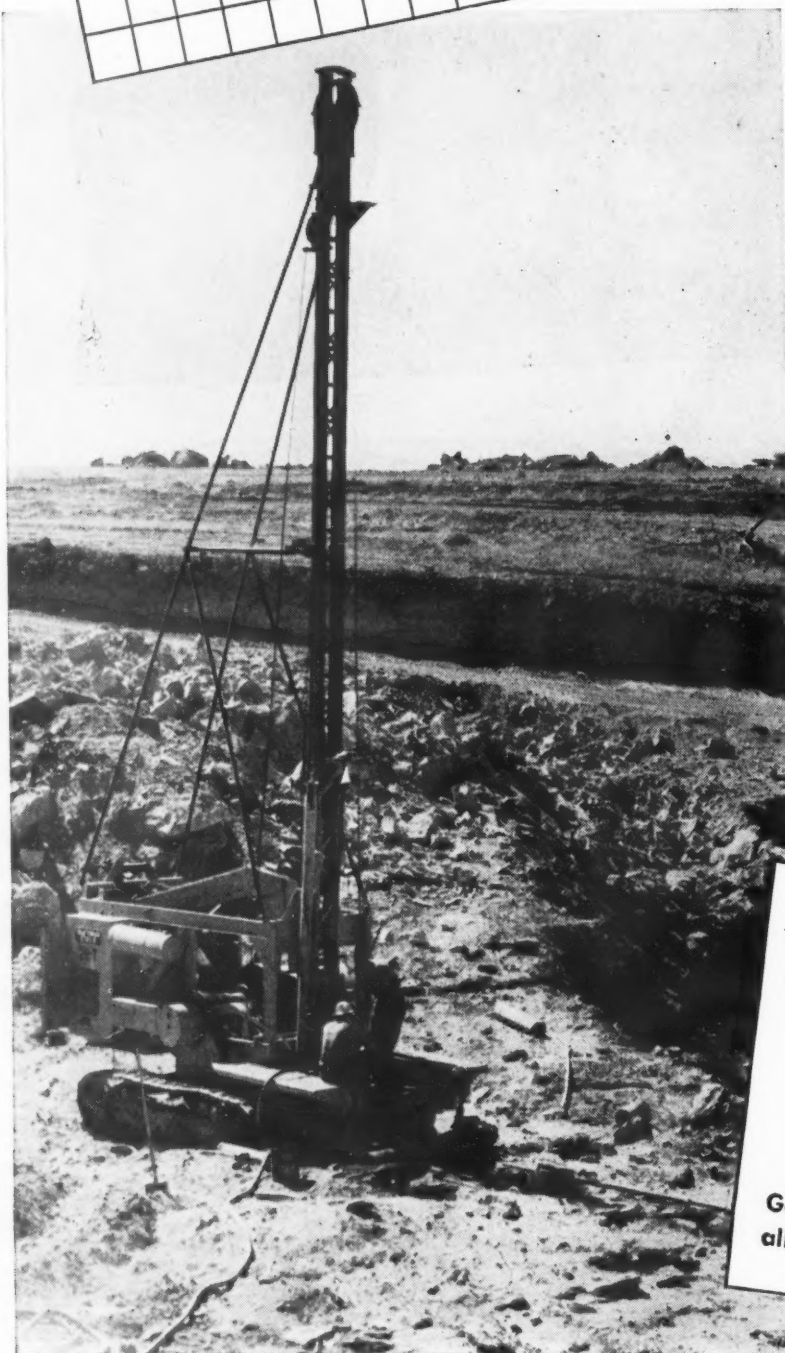
WILFLEY
centrifugal PUMPS

A. R. WILFLEY & SONS, INC., DENVER, COLORADO, U. S. A.

New York Office: 1775 Broadway, New York City

HOW BUCYRUS-ERIE BLAST HOLE DRILLS CAN SAVE YOU MONEY

**More Footage
Per Shift**



There's no secret behind the greater drilling footage provided by Bucyrus-Erie blast hole drills throughout each shift. Take a look at the story:

1. Fast, Steady Drilling Motion. Accurately timed drilling action produces more effective blows per minute . . . permits tools to strike with maximum force. Stroke length may be varied to fit the formation.

2. Rapid Penetration results largely from a derrick-head rubber shock absorber that gives the tools extra reach, then instantly snaps them back the moment the blow is struck. With maximum penetrating power thus concentrated on the hole bottom, faster rock preparation is assured.

3. Properly Fitted Tool Weights, with weights determined by the type of job to be handled, also help insure shattering drilling blows for more footage per shift at less cost per foot. Each model Bucyrus-Erie rig has ample capacity to do the most effective drilling job in its size range.

**BUCYRUS
ERIE**

SOUTH MILWAUKEE, WISCONSIN

It will pay you to check these Bucyrus-Erie blast hole drills when you plan your new equipment purchases:

22-T 5 5/8"	to	6 5/8" holes
27-T 6"	to	6 5/8" holes
29-T 6"	to	9" holes
42-T 9"	to	12" holes

Gasoline or electric power is available for all machines, diesel for all except the 22-T.

22-B49

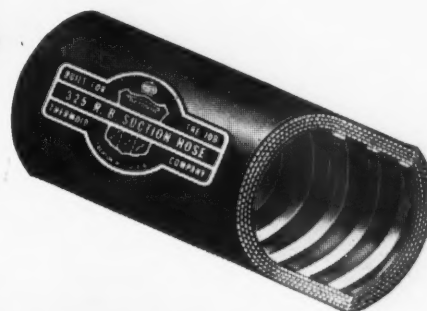
Thermoid Water Suction Hose

Made in a Type to Suit Every Job

Water Suction Hose is generally subjected to rough usage. Thermoid has studied carefully the service conditions under which it is used and has designed several types from which you can pick the one best suited to the job you have to do.

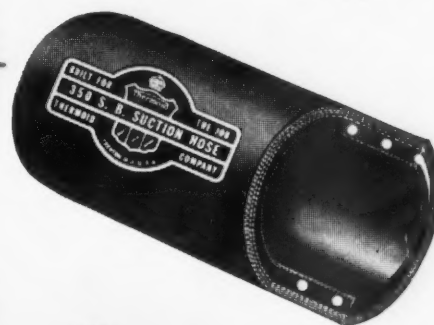
For the Toughest Kind of Duty Use Thermoid #325 Type

This hose is made in smooth or rough bore. Use smooth bore when sand, dirt or other abrasives are in the water to be handled. Use the more economical rough bore type when the water is free of abrasives. Each type has a high quality tube, strong wire reinforcing, then plies of specially woven duck with a weather and abrasion resisting cover. Supplied in sizes 1½" to 6" in lengths up to 50 ft.



For Less Severe Service Use Thermoid #350 Type

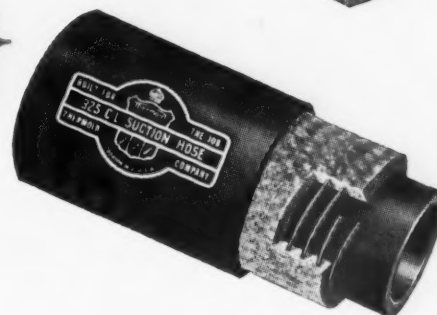
Somewhat lighter in construction, but with plenty of long life quality for less severe jobs. This hose comes in smooth or rough bore, wire and duck reinforced, with weather and wear resisting cover. Supplied in sizes 1½" to 6" and in lengths up to 50 ft.



For Normal Light Duty Use Thermoid Type #325-CL

It's an economical hose for normal light duty service. The water way is smooth, resistant to action of gritty particles, the reinforcement of high carbon steel wire interwoven with heavy cotton yarn, cover of sufficient thickness and strength to resist abrasion and rough handling. Furnished in sizes of 1½" to 6", in lengths up to 50 ft.

Other types of Thermoid Suction Hose include Oil Suction, Sand Suction, Agricultural, Hard Rubber and Fire Engine. Catalog information on request.



The Thermoid line includes: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Custom Molded Products • Industrial Brake Linings and Friction Materials.

Thermoid
Company

Main Offices and Factory • Trenton, N. J., U. S. A.
Western Offices and Factory • Nephi, Utah, U. S. A.
Industrial Rubber Products • Friction Materials • Oil Field Products

WHITNEY *Universal* MINING CHAIN



Gives You EXTRA VALUES that Pay Off in Tonnage

There's no place in today's tough schedules for "time-out" of loaders. Replace worn, inefficient loader chain with Whitney Universal Mining Chain and you can rest assured that this equipment won't quit because of chain failure.

Whitney Universal Mining Chains are built to take the tough, rugged service of coal mining. Their heat-treated alloy steel parts assure maximum workability... keep equipment going under continuous long runs.

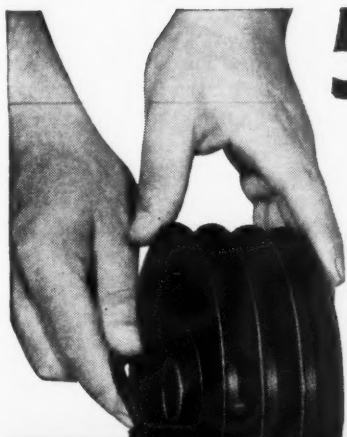
Note these construction plus values — accurately machined Universal joints constructed of steel forgings for toughness. Fully machined Flight Studs with milled threads. End pins are riveted into deep countersinks in the forging to provide positive anchorage. Roller Chain Parts are made of alloy steel parts, hardened to provide extreme strength.

It will pay you to *standardize on Whitney Chain and Accurately Cut Tooth Sprockets* for dependability, smooth operation and long life. See your distributor or write:

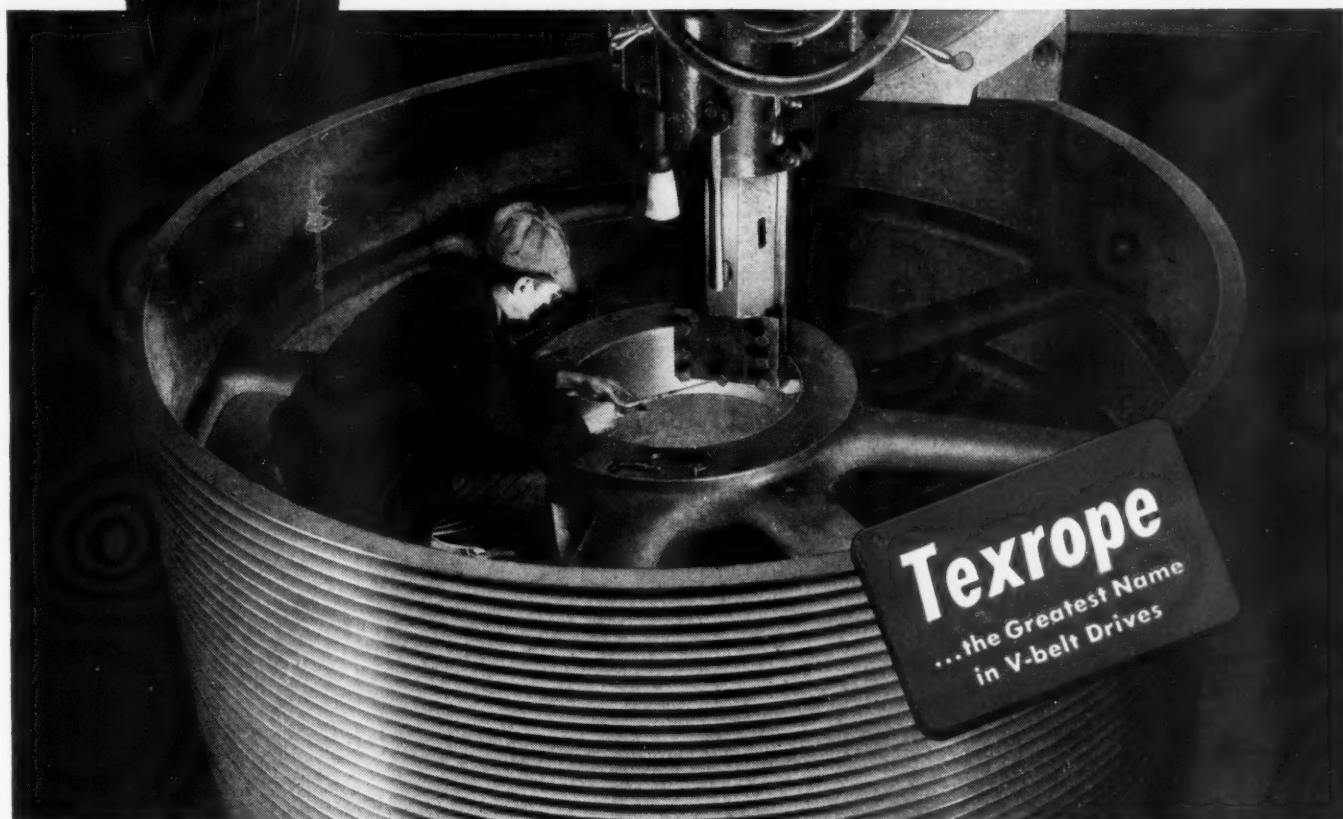
WHITNEY CHAIN & MFG. COMPANY

Division of Whitney-Hanson Industries Inc.

210 HAMILTON STREET, HARTFORD 2, CONNECTICUT



**5.4 or 108 inch... every
Magic-Grip Sheave is
"Easy On... Easy Off!"**



Largest Ever Built! This specially-built 108 inch *Magic-Grip* sheave was ordered for the same reason that thousands of smaller stock sheaves are ordered. It comes completely assembled . . . goes on the shaft without a struggle . . . grips like a vise . . . and is just as easily removed! Stock *Magic-Grip* sheaves from 1 to 250 hp are available through your nearest Allis-Chalmers dealer or district office.

Get Magic-Grip Sheaves In "Pre-Engineered" Drives

New 144-page "Pre-Engineered" *Texrope* drive manual lists 22,000 economical stock drives from 1 to 150 hp—meets 90% of all V-belt drive requirements. Ask for Bulletin 20B6956. **ALLIS-CHALMERS, MILWAUKEE.** *Texrope*, *Super-7*, *Texsteel*, *Texdrive*, *Magic-Grip* and *Vari-Pitch* are Allis-Chalmers trademarks.

A 2430

A Complete Range of Products

Super-7 V-belts	5 types . . . sizes to suit every power transmission job	
Texsteel, Texdrive, Magic-Grip	Sheaves in a full range of sizes and grooves	
Vari-Pitch Sheaves	Exact variations in speed—Stationary or Motion control	
Speed Changers	Speed variations up to 375% at the turn of a crank	

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices.



ALLIS-CHALMERS
Originators of the Multiple V-belt Drive for Industry

"Get it from Crane"

... piping equipment for every need

A good slogan to remember! "Getting it from Crane"—long the accepted standard of many leading mines—means quick selection of whatever you need in valves, fittings, pipe line accessories, and pipe. For the complete Crane line offers the world's widest choice of quality piping equipment—in brass, iron, steel and alloy materials.

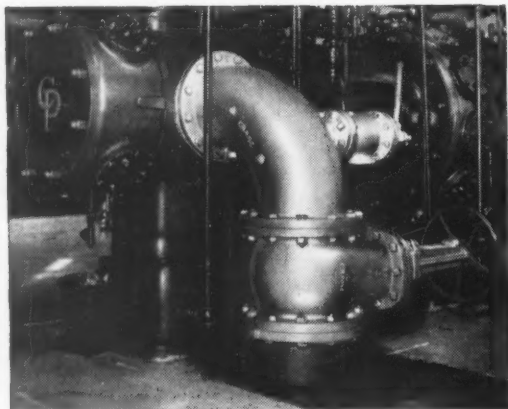
Complete selection is but one reason for standardizing on Crane—just one feature of the 3-way advantage that's yours when you "get it from Crane":

ONE SOURCE OF SUPPLY helps to simplify all piping procedures—from specifying and ordering, to erection and maintenance. One catalog and one order cover everything for the job.

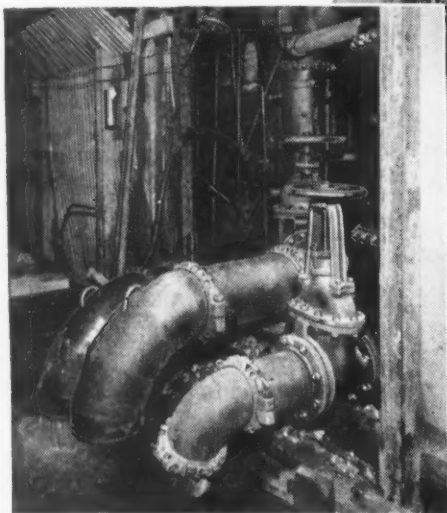
ONE RESPONSIBILITY for materials helps to get the best installation and to avoid needless delays.

OUTSTANDING QUALITY in every item from Crane means uniform efficiency and dependability in every part of piping systems.

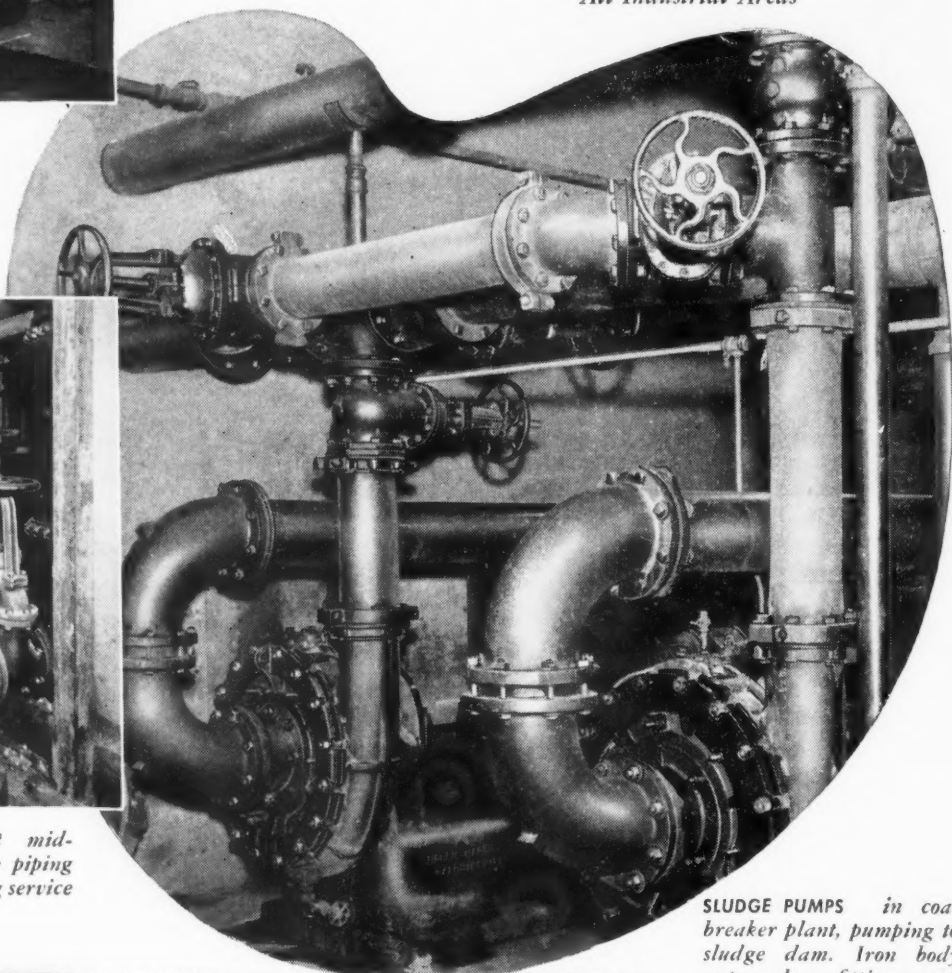
Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving
All Industrial Areas



COMPRESSOR IN COPPER MINE power house equipped by Crane, showing Crane iron double-disc gate valve, safety valve, and flanged fittings.



DRAINAGE WATER STORAGE at mid-level in deep pit where Crane piping materials are giving outstanding service under severe conditions.



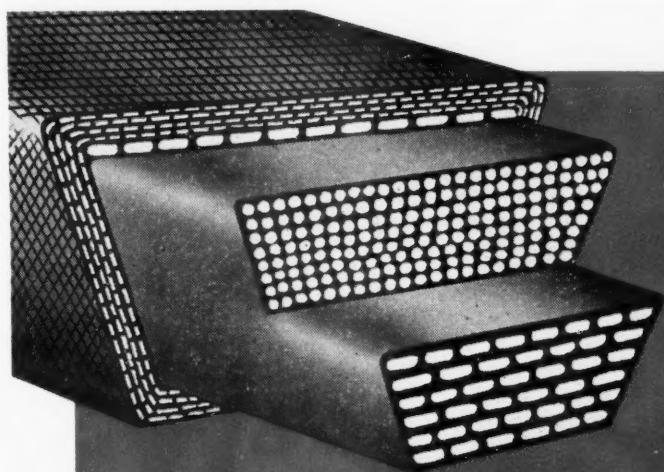
SLUDGE PUMPS in coal breaker plant, pumping to sludge dam. Iron body gate valves, fittings, and pipe from the complete Crane line.

EVERYTHING FROM ...

VALVES • FITTINGS
PIPE • PLUMBING
AND HEATING

CRANE

FOR EVERY PIPING SYSTEM



BULL DOG V-BELTS

HELP THE COAL INDUSTRY BUILD GREATER PRODUCTIVITY



In the present postwar rush for greater production, there's a noticeable trend toward bigger machines with higher operating speeds. Thus more work is turned out, and V-Belts have to carry heavier loads and stand more punishment.

Bull Dog V-Belts are designed to meet these present day conditions. They're entirely new — not a rehash of old construction, but a brand new product developed in BWH laboratories to do your job better, for a longer time, at lower cost. Test runs in leading industries prove that Bull Dog V-Belts more than measure up to laboratory predictions of amazingly increased efficiency.

In the short time they've been on the market, Bull Dog V-Belts have won phenomenal acceptance. Here's why:

EXCLUSIVE BWH Bull Dog Cords have greater tensile strength.

EXCLUSIVE BWH Compounds run cool, don't crack, or deteriorate under severe flexing.

EXCLUSIVE BWH Covers of heavy, bias-cut material resist wear, protect against dirt, grease, moisture.

Specify Bull Dog V-Belts on your next installation. You'll be glad you did, when you see maintenance cost sheets and production records!

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. For all industrial rubber needs, look to BWH products for dependable ruggedness, BWH distributors for dependable service.

Another Quality Product of
BOSTON WOVEN HOSE & RUBBER COMPANY
Distributors in all principal cities

PLANT: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.



He's Fussy about Rope Lubrication

The Bethlehem wire-rope man has an eagle eye. He can spot a "dry" rope a mile away... although he doesn't like to find one, for hard-working wire rope should never be allowed to operate dry—unlubricated—for any length of time.

This is a fundamental too often overlooked. Frequently Bethlehem engineers encounter ropes so dry that serious harm has already resulted. Sometimes—strange as it seems—the user doesn't realize how *vital* lubrication really is. Sometimes he's merely forgotten—or meant to take the proper steps but got too busy.

For best results and longest life, wire rope must be lubricated. Why? Because lubrication reduces internal friction—the friction of wire against wire. Because it reduces

the friction of rope against sheaves, rope against drum. Because—important!—it helps prevent destructive rust from getting a start.

True, in some services, the original factory lubrication provides adequate protection throughout the useful life of the rope. But this is not *always* the case. So, when a Bethlehem man comes to check your ropes, lubrication is one of the first things he'll look into. It's his business to see that you get the correct wire ropes for your job—but he also wants you to *get the most out of them*. Proper lubrication is a long step in this direction.

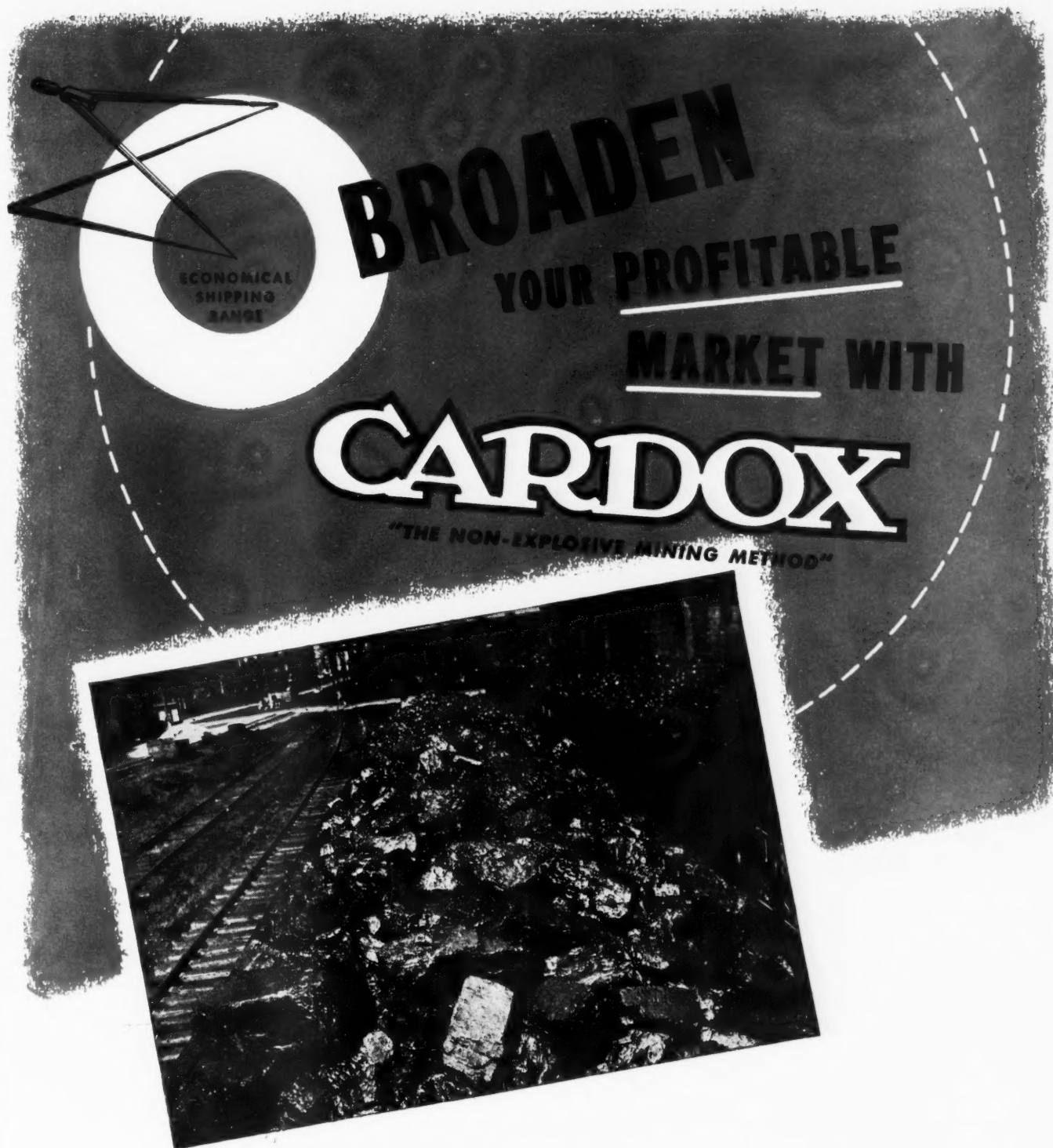
If you need advice on this or any other wire-rope problem, call for a Bethlehem engineer. He's part of a nationwide network whose services are always available.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM





BROADEN
YOUR PROFITABLE
MARKET WITH
CARDOX
"THE NON-EXPLOSIVE MINING METHOD"

ECONOMICAL SHIPPING RANGE

A diagram of a compass is shown in the upper left, with a line indicating a specific range. Below the main text is a photograph of a large pile of coal, with a single block of coal in the foreground.

● CARDOX-mined coal is commonly shipped to markets far beyond the safe shipping range of "explosion shattered" coal from the same region. The gentle heaving action of CARDOX does not produce shattercracks. It breaks down the coal in solid firm chunks that resist degradation—retains its premium size—through long shipments and rough handling in dealers' yards.

Write for full details on free demonstration of CARDOX production economies and marketing advantages.

CARDOX CORPORATION Bell Building • Chicago 1, Illinois



They "Deliver the Goods" IN HIGH STYLE . . . AT LOW COST



You'll find that Chevrolet Advance-Design trucks offer *more of what you want* in your trucking operations.

They have the class of advanced styling . . . smart, modern appearance that speaks well for your business wherever they're seen.

And they back up the promise of their looks with advanced engineering that puts them far ahead in rugged durability, economy of performance, driver comfort.

Check over the features of these newer, finer Chevrolet Advance-Design trucks. Check over the costs of ownership. You'll find they're the only trucks that bring you Chevrolet's 3-way thrift—the *triple* economy of low operating costs, low upkeep costs and the *lowest list prices in the volume field!* See your Chevrolet dealer—and test the best!

CHEVROLET MOTOR DIVISION, General Motors Corporation,
DETROIT 2, MICHIGAN

Here Are the Features You Want . . . And Only Chevrolet Advance-Design Trucks for '48 Have Them All!

FLEXI-MOUNTED CAB, cushioned against road shocks, torsion and vibration—New Advance-Design-Gearshift Control and Foot-Operated Parking Brake in models with 3-speed transmissions . . . IMPROVED VALVE-IN-HEAD ENGINE, more durable and efficient . . . 4-SPEED SYNCHRO-MESH TRANSMISSION on Heavy-Duty models for quicker, quieter shifting . . . SPLINED AXLE HUB CONNECTION on Heavy-Duty models provides greater strength and durability . . . OTHER ADVANCE DESIGN FEATURES: The cab that "Breathes"* . . . Uniweld, all-steel cab construction . . . New, heavier springs . . . Hypoid Rear Axles on ¾-ton and heavier models . . . Hydrovac Power Brakes on Heavy-Duty Models . . . Ball-Bearing steering . . . Wide Base Wheels . . . Standard cab-to-axle dimensions . . . Multiple color options.

*Fresh air heating and ventilating system optional at extra cost.

**CHOOSE CHEVROLET TRUCKS FOR
TRANSPORTATION UNLIMITED**

CHEVROLET ADVANCE DESIGN TRUCKS

Lubricant storage and handling *simplified!*



Gulf Mining Machine Lubricant B

does the job of 2 or 3 other lubricants
— and does it better!

When you use Gulf Mining Machine Lubricant B you can eliminate from 2 to 3 other lubricants depending on the type of equipment you operate. This means less confusion at the face, elimination of application mistakes, better lubrication.

At the same time Gulf Mining Machine Lubricant B provides better protection for cutting and loading machines: its heavy body means less leakage from gear cases; its superior lubricating value insures less wear; its exceptional adhesiveness prevents throwoff or channeling; and it resists the washing action of water.

Gulf Mining Machine Lubricant B is equally effective for plain and antifriction bearings and for gears in drives and transmissions.

To get the many benefits possible with this quality product, and for expert help in other phases of improved lubrication, call in a Gulf Lubrication Engineer. Write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation • Gulf Refining Company

Division Sales Offices:

Boston • New York • Philadelphia • Pittsburgh • Atlanta
New Orleans • Houston • Louisville • Toledo




Keep'em on the Job...



**SINCLAIR
SPECIALIZED
LUBRICANTS**

.with

CORRECT LUBRICATION



A vital factor in keeping equipment available for continuous service is correct lubrication of every part of the vehicle. Failure of the smallest part—due to deficient lubrication—may put the entire machine in the shop . . . and shop time is non-revenue time.

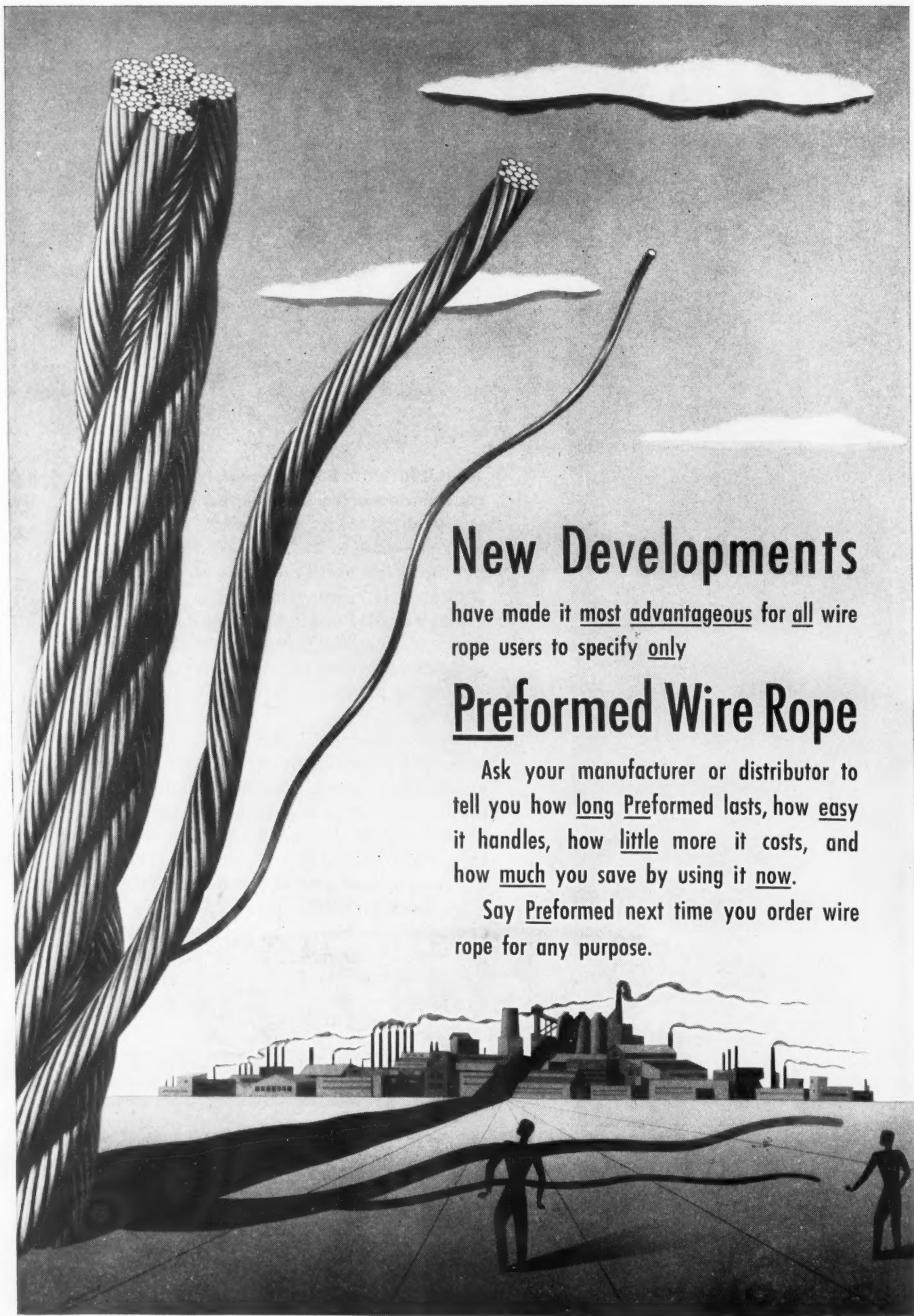
Sinclair All-Point lubrication can be your guard against equipment lay-off. Sinclair lubricants are made for specific service at every individual point . . . to help keep machines moving.

Try . . . Opaline TBT, or Tenol in Diesels for sure, safe engine lubrication . . . non-foaming Opaline Gear Lubricant with extreme pressure properties to prevent galling and scuffing . . . Shamrock Lubricant for stay-put chassis lubrication in all weather . . . Sincolube for assured, enduring wheel bearing lubrication.

Let these tested lubricants help keep your equipment available . . . regularly and economically . . . always.

SINCLAIR AUTOMOTIVE LUBRICANTS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE
SINCLAIR REFINING COMPANY, 630 FIFTH AVE., NEW YORK 20, N. Y.



New Developments

have made it most advantageous for all wire rope users to specify only

Preformed Wire Rope

Ask your manufacturer or distributor to tell you how long Preformed lasts, how easy it handles, how little more it costs, and how much you save by using it now.

Say Preformed next time you order wire rope for any purpose.

YOU CAN SEE

*why . . . Maintenance is less
when . . . Inspection's no guess*

It's rhyme *and* reason, for a locomotive is given proper inspection and maintenance only if it can be done with minimum effort. Westinghouse Mine Locomotives have *all* of the features to meet this requirement.

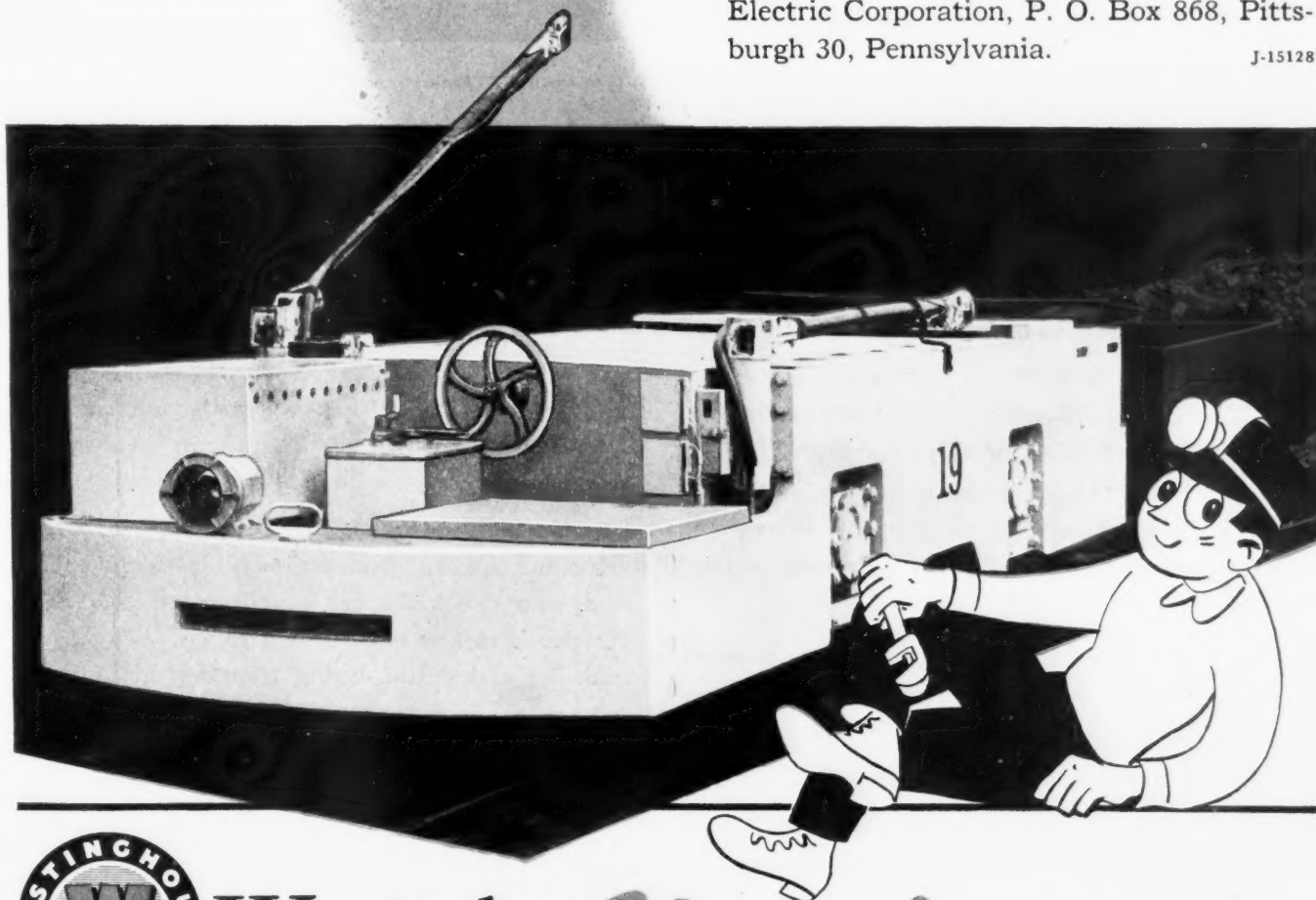
The reason is simple. Westinghouse not only provides the best mechanical and electrical details . . . but assembles them to permit *maximum accessibility*.

Here are a few examples of how this 15-ton mine locomotive meets these requirements:

- **FLUSH SIDE FRAME** gives several extra cubic feet of equipment space.
- **UNIT SWITCHES** are mounted across the front end of the locomotive for simple inspection.
- **MAIN RESISTOR** is mounted in one frame . . . eliminating unnecessary wiring and connections.
- **WIRING** is laid in metal troughs for increased accessibility and protection.
- **JOURNAL BEARINGS** are adjusted by merely turning an accessible lid.
- **BRAKE SPREADER** is easily adjusted. The locomotive side frames are cut away at the point of adjustment to permit ease of accessibility.

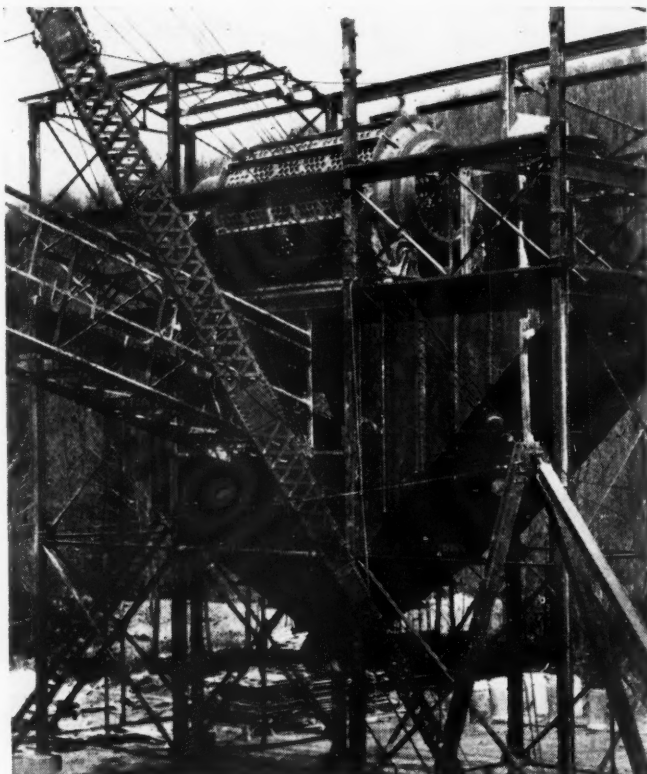
For further proof call your nearest Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-15128



Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Mine Locomotives



Typical Pile of Refuse, Discharged Automatically. Latest Type Open End "Pennsylvania" Bradford Breaker.

PREPARE **ROM** for Cleaning the Most Economical Way

The "Pennsylvania" Bradford crushes and conditions ROM coal for cleaning or shipment at the lowest possible power and maintenance costs—units installed 40 years ago are still in daily operation—screen plates, which get most of the wear, frequently last 10 years or more.

Crushing is by gravity impact, with continuous screening, producing a uniform product—maximum large sizes—minimum fines—no oversize—ideal sizing for coal cleaning plants.

In conditioning ROM for cleaning, the scavenging of large refuse and the recovery of good coal clinging to high ash impurities are equally important as efficient crushing. The "Pennsylvania" Bradford is the only crusher that mechanically scavenges hard refuse—it automatically removes and discharges mine

timbers, tramp iron, blasting wire, sulphur balls, slate and rock which are larger than the Bradford screen perforations.

The adaptability of the Bradford for preparing coal at mines and cleaning plants is always a matter for special study—no two cases are exactly alike. Our usual practice is to first make a field survey, then test the coal. We maintain a testing plant for this purpose.

Let us help you with your crushing problems.



Liberty Trust Bldg.

Philadelphia 7, Pa.

New York • Pittsburgh • Chicago • Los Angeles • Birmingham
Associated with Fraser & Chalmers Engineering Works, London

How to choose a mine conveyor



1 Buy it like you do a refrigerator

When you buy a refrigerator, you get a completely engineered unit. You don't buy the compressor one place and the cabinet another. Follow that same principle when you buy a mine conveyor. Buy the conveyor machinery from the same source that supplies you with the belting.



2 Depend on one source for everything

Like your refrigerator's compressor and cabinet, your conveyor's machinery and belting must be engineered to work together. So, get *both elements* from the same manufacturer. Insist on undivided responsibility for the whole job. Your entire conveyor will last longer . . . work better.

3 Specify Hewitt-Robins Mine Conveyors

The Hewitt-Robins Mine Conveyor is the *only* one you can buy as a complete "package." You get machinery and belting engineered as a unit . . . and installed by Hewitt-Robins service engineers. In fact, Hewitt-Robins is the *only* company that offers you this undivided responsibility.



4 Remember this fact—

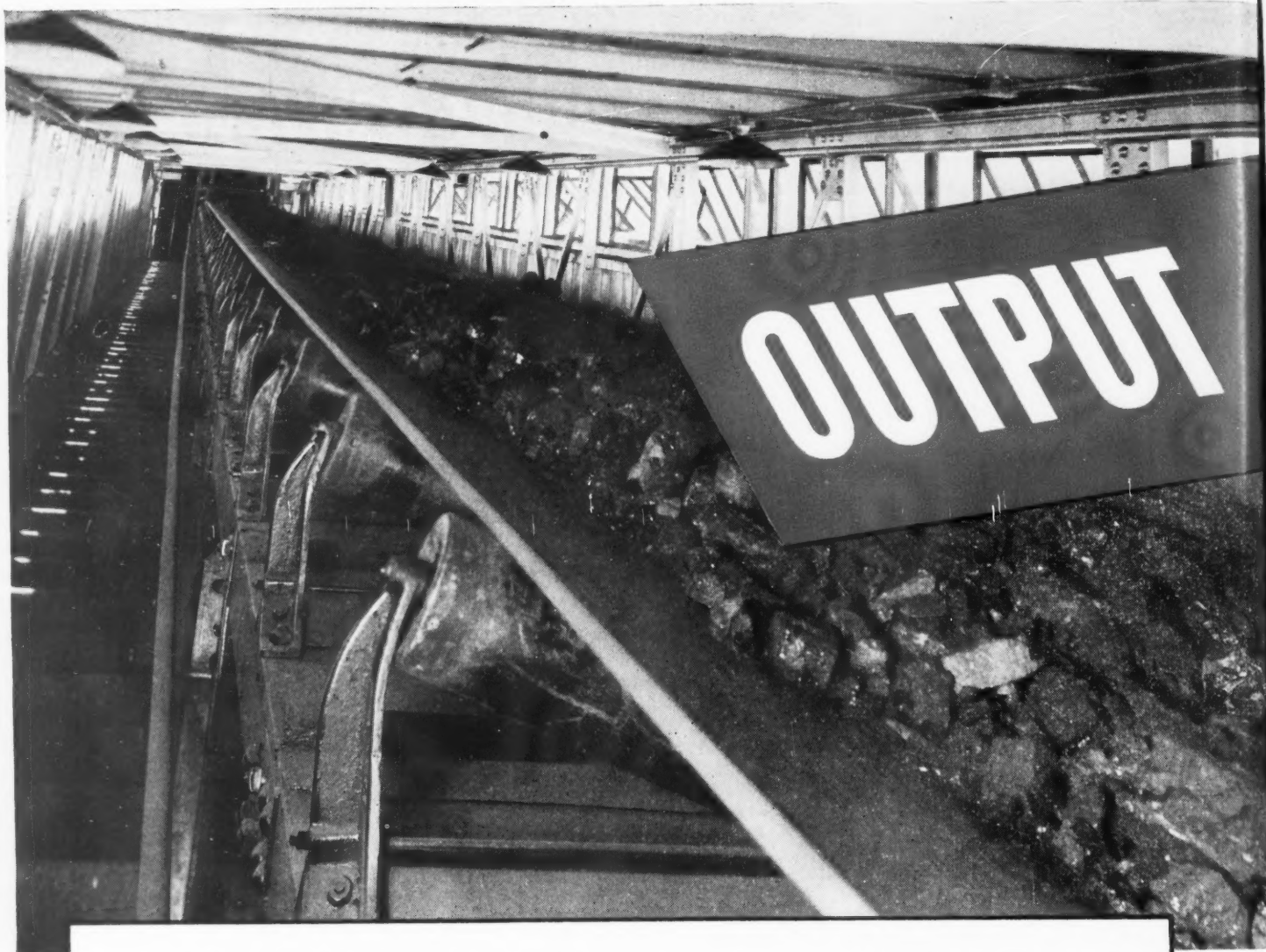
A Hewitt-Robins Mine Conveyor lasts longer . . . for it is the only one engineered, manufactured, and installed as a complete unit.

What's more, it's carried in stock for immediate delivery at Passaic, N. J. and Charleston, W. Va. Call on us for information about Hewitt-Robins Mine Conveyors. Hewitt Rubber Division, 240 Kensington Ave., Buffalo 5, N. Y.—or Robins Conveyors Division, Passaic, N. J.

Hewitt-Robins Mine Conveyors

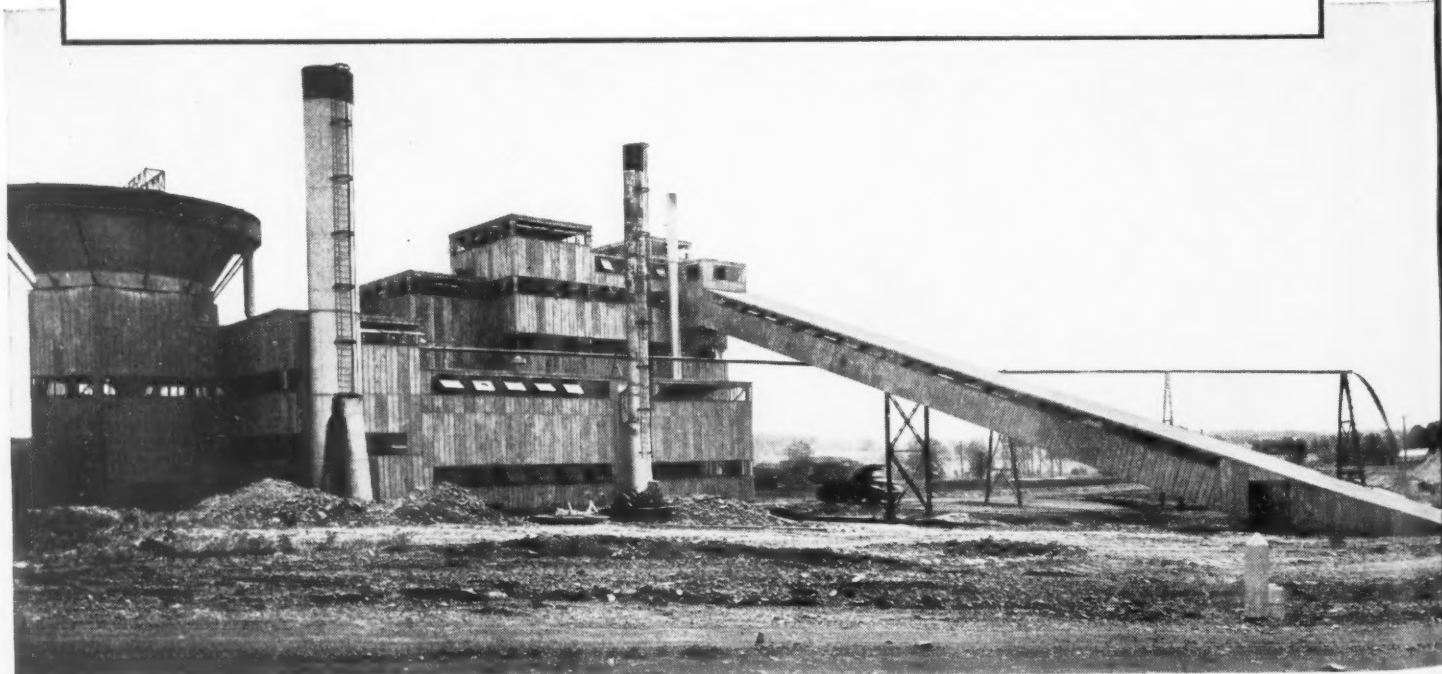
made by **HEWITT-ROBINS Incorporated**





This 54" U. S. Matchless Slope Conveyor Belt carries run-of-mine coal from hopper to preparation plant.

Designed by Coordinated Engineering for 1000 T. P. H., this belt has been operating successfully for over 8 years—the highest tonnage era in coal history.



UP, COSTS DOWN

invariably occur when your mining engineer, your equipment engineer and the U. S. Rubber belt engineer pool their skills in Coordinated Engineering. How about talking over this modern formula for low-cost haulage in your mechanization program?

Write Mechanical Goods Division,
United States Rubber Company,
1230 Avenue of the Americas, New
York 20, N. Y.



Underground belts as well as slopes are important in the plan of coordinated three-way engineering, advocated by U. S. Rubber.

PRODUCT OF

U.S. RUBBER

SERVING THROUGH SCIENCE

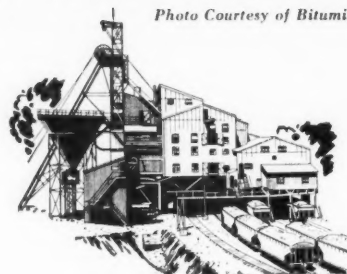
UNITED STATES
RUBBER COMPANY

Four Mines tell similar stories



... about CP Drill Arms

Photo Courtesy of Bituminous Coal Institute



Eighty 4½ inch diameter, 8-foot holes per shift is the regular performance in an Ohio mine for each of two CP Drill Arms, with CP-580 permissible electric coal drills, mounted on locomotives. Each unit is operated by one man. Working ten 22-foot places per shift, in each place four holes are drilled in rock and four in coal for Airdox shooting.

In another mine ninety-six 2½ inch diameter, 8-foot holes are drilled per shift, in sixteen 22-foot places. Here again the CP Drill Arm, mounted on a locomotive, is operated by one man.

In a third mine, the CP Drill Arm, with CP-580 drill,

is mounted on a mine car, hauled by a mine locomotive. Drilling entirely in rock, twenty-two places are drilled per shift, with four holes per place. The holes are 1⅞ inches in diameter and 6 feet deep, and drilling time per hole runs from 45 to 50 seconds.

The CP Drill Arm, with CP-580 drill, is mounted on a truck in a fourth mine. In development work, with one-man operation, it is drilling ten 22-foot places per shift, with eight 2½ inch diameter, 8-foot holes in each place, four in rock and four in coal.

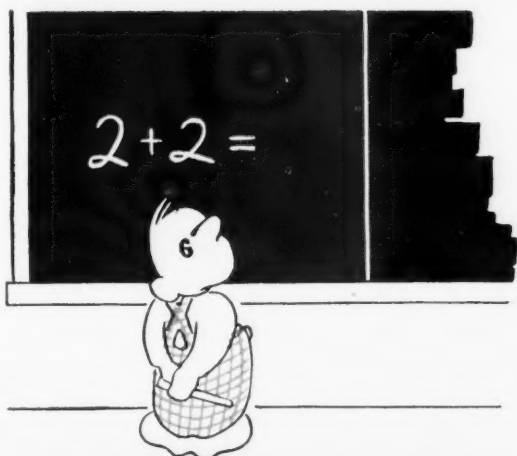
Write for SP-2081, giving full information on this electrically powered and controlled Drill Arm unit.



CHICAGO PNEUMATIC TOOL COMPANY

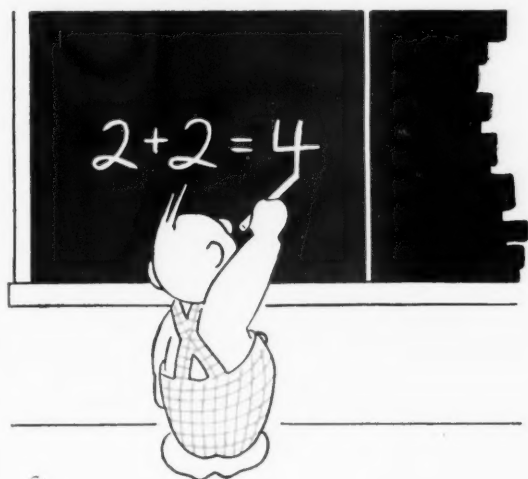
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



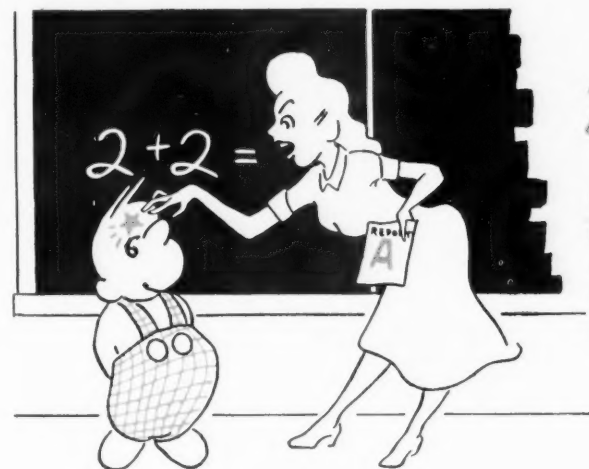
Problem:

The busy coal operator wants to concentrate on production and not lose valuable time by becoming entangled with such worries as SALES, TRAFFIC, MARKETS, CREDITS and SALES ACCOUNTING. The problem can be as simple as two and two . . .



Solution:

The answer is always four which means your worries as an operator can be easily eliminated by calling in a competent sales service like Snyder & Swanson. Find out for yourself how we have solved the same problem for many other operators.



Results:

Grade "A" results will be yours. Retaining a complete sales service will bring you higher profit and much more time to concentrate on your production. You'll be as proud as Johnny with his gold star when you join the lucky operators who are achieving greater PROFITS.

Snyder & Swanson

COAL MERCHANDISERS

Main Office: PITTSBURGH, PA.



INC.

BRANCH OFFICES

- CLEVELAND
- BALTIMORE
- NEW YORK

Shipment By:

RAIL • LAKE • TIDEWATER



*Features
that are important
to successful
coal mining...*

JOY

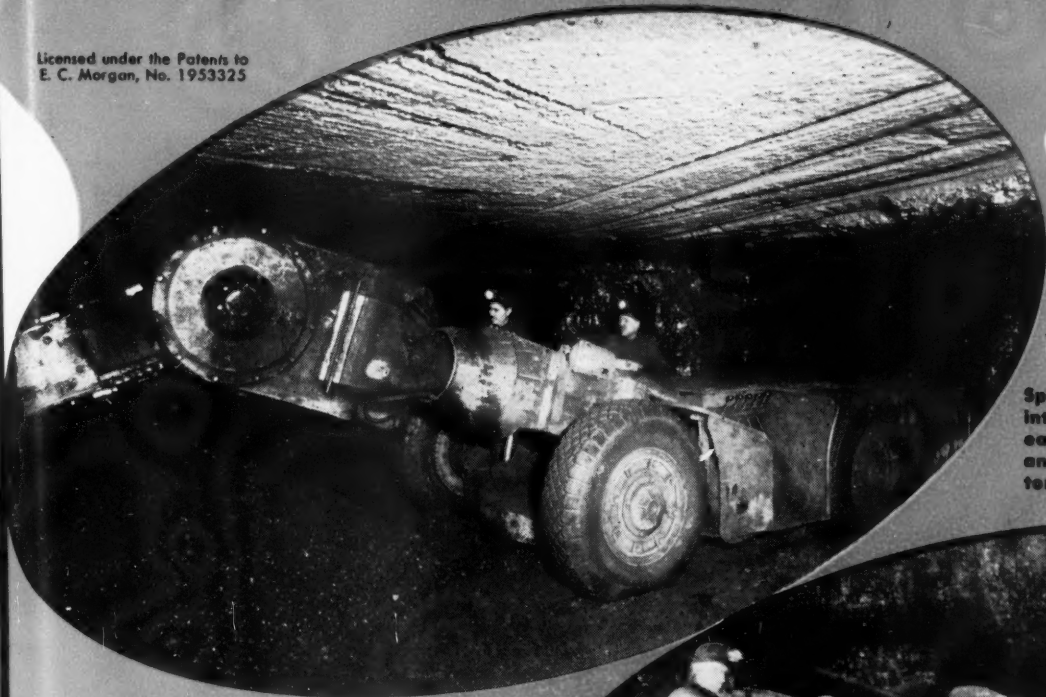
MINING EQUIPMENT

is time proved to lower costs
• increase tonnage . . . operate economically

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BUILDING
PITTSBURGH 22, PA.

Licensed under the Patents to
E. C. Morgan, No. 1953325

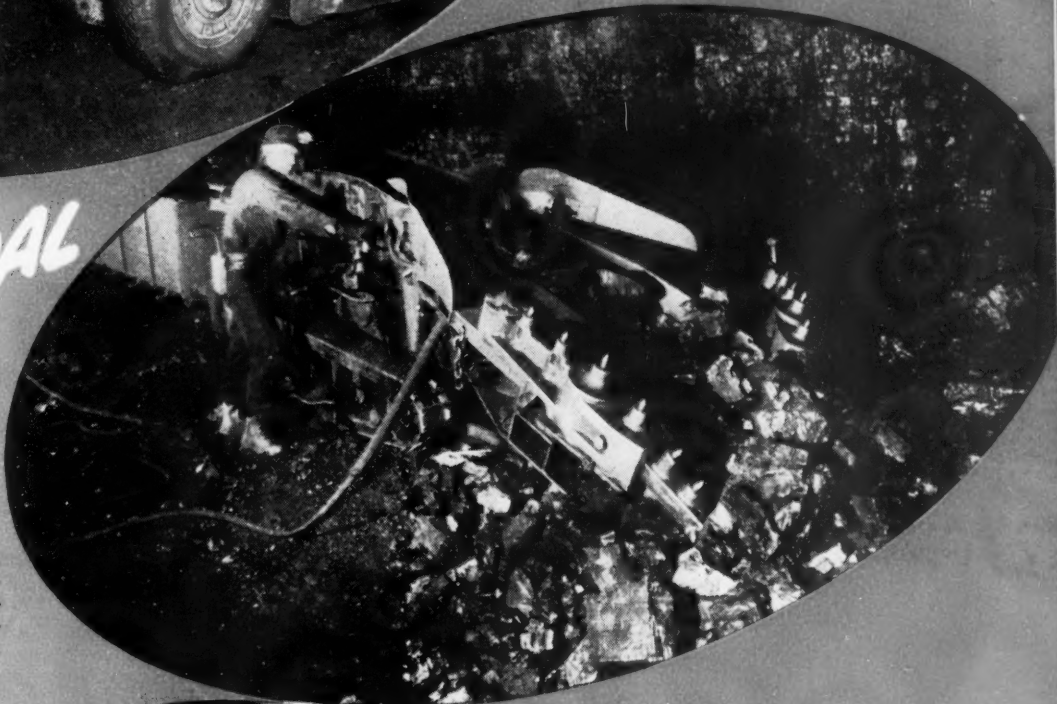


**CUTS
COAL
FASTER**

Speed, power and durability are built into every Sullivan Coal Cutter. Their ease of operation, maneuverability and fast cutting speeds mean more tonnage per shift.

**LOADS COAL
FASTER**

Proved under a wide range of conditions, high seams and low, Joy Loaders move more tonnage per shift more quickly, reducing loading cost per ton to lowest possible figures.



**MOVES
COAL
AT LESS
COST**

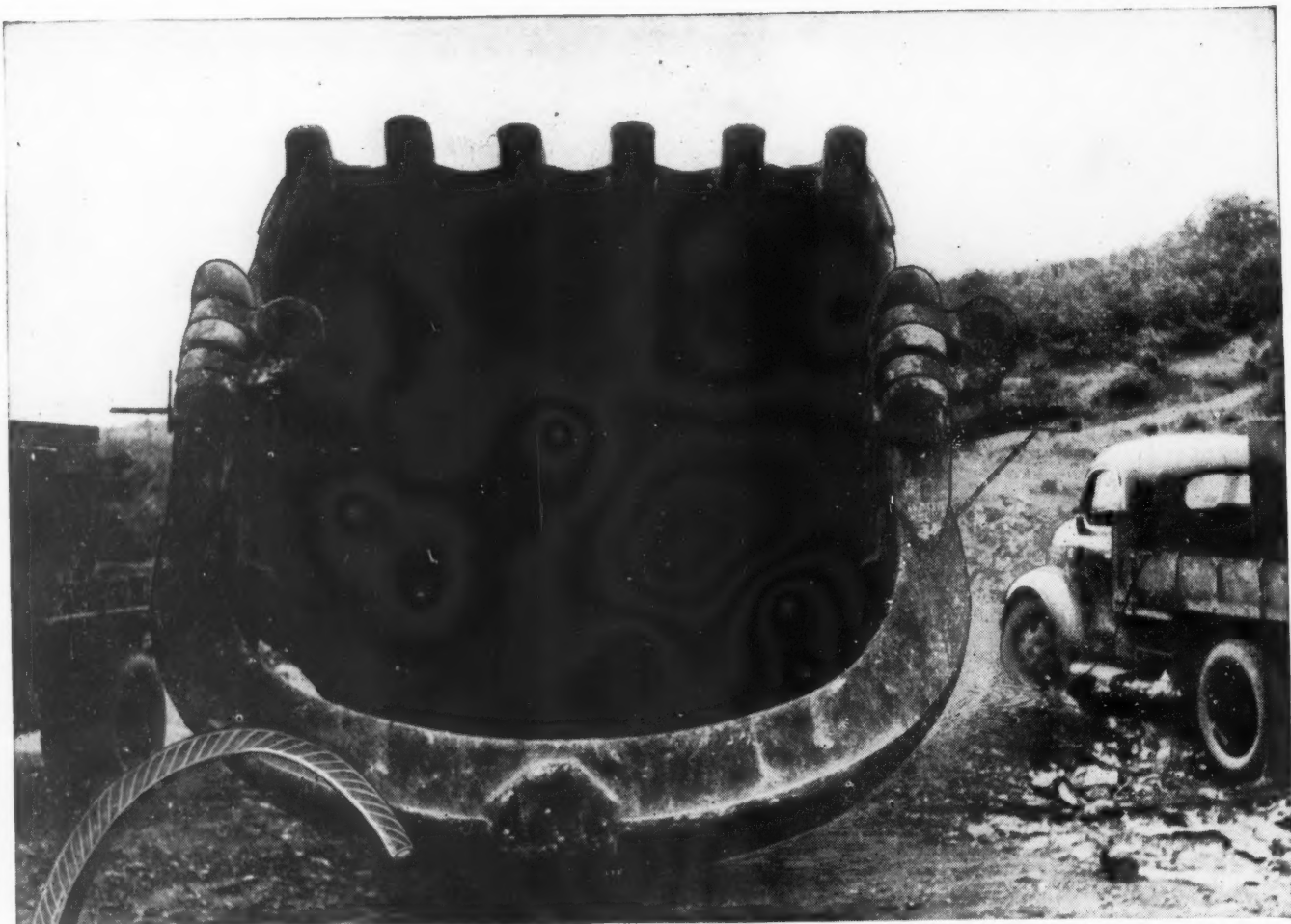


Shuttle Car mining has shown startling cost reductions wherever seam conditions permit its use. Joy Shuttle Cars are proved to be rugged, with low maintenance features.



Consult a Joy Engineer for

"The World's Most Complete Line of Mining Equipment"



Photograph courtesy The Philadelphia and Reading Coal and Iron Company

requires good **BLASTING**

Even a giant bucket like this one won't fill up every time unless you have good fragmentation — the kind you get when you shoot with Primacord.

Primacord develops a hard-working combination of *full power* and *relief of burden* that results in this better fragmentation. *Full power* — because every charge is loaded in *direct contact* with Primacord . . . no matter how many holes you have, or how deep they go, *every* cartridge is detonated at *peak explosive power*. *Relief of burden* — because you can plan your shots so that front lines go a split-second before succeeding ones. Together, these two forces go all out to *boost yardage* and *reduce costs*.

Primacord has other advantages too. Packed on easy-to-handle spools, it's sure-fire in all kinds of weather. Hook-ups are made by simply tying trunk and branch lines together with half hitches. Insensitive to stray currents, Primacord is the logical detonator to use near high voltage electrical equipment.

There's a grade of Primacord to meet every blasting condition. Ask your explosives supplier about it — or write us direct.

P-3

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN.

Also ENSIGN-BICKFORD Safety Fuse • Since 1836

PRIMACORD-BICKFORD

Detonating
• Fuse •

SEPTEMBER, 1948

IVAN A. GIVEN, EDITOR

Still the Winner

SOMEWHAT BELATEDLY, the Department of Commerce has joined the ranks of those still trying to write off the coal industry and put oil, natural gas and water power in its place. In a press release July 26, the Department declares that coal has been knocked out of its once-dominant position as a source of energy. Source of energy for what—space heating, electric-power generation, pig-iron production, railway fuel, general manufacturing and so on? Coal leads all forms of competition in all these categories by a substantial to an overwhelming margin.

Competition, in fact, leads only in the motor-vehicle field where, of course, coal manifestly could not compete in the past. But it will in the relatively near future. Even aside from that, however, those, like the Department of Commerce, that are trying to write the industry off should ponder the latest figures on energy requirements. In 1947, coal's share in the total rose to 49.9 percent from 48.4 percent in 1946. Oil dropped from 33.9 percent in 1946 to 32.9 percent in 1947; natural gas from 13.4 to 13.3 percent; and water power (at prevailing central-station equivalent) from 4.3 to 3.9 percent. In view of the production and price difficulties being increasingly experienced by competition, this 1947 reversal in trend takes on even deeper significance.

Rather than that it has lost its dominant position, the logical conclusion, in the light of all the evidence is that coal will be called upon more and more to supply the increased energy demand of the future. Practically unlimited reserves and ability to expand production on short notice are major assets. Another is price. In spite of increases, coal still is the cheapest form of energy today and there is no indication that it will lose that advantage in the future. By building on these and other basic advantages through better preparation, better merchandising and research, and

by continuing to concentrate on cost reduction, the industry can accelerate the swing back to its product. Coal still has the winning hand and has only to play it with reasonable skill.

Basic Requirement

"MORE CAPITAL EQUIPMENT" is correctly rated as the outstanding need of the bituminous industry by Dr. Donald R. G. Cowan, consulting economist, National Coal Association, in a report released Aug. 3 by the association. While the report deals only with the bituminous industry, there is every reason to believe that the conclusions apply with equal force to anthracite.

Why is more capital equipment necessary? Because it is a major road to lower costs and prices, which always have been and will remain coal's chief weapon in meeting competition. A second major road to lower costs, referred to but not developed in the Cowan report, is, of course, better use of equipment. While increasing production from thinner seams and under more adverse natural conditions is a factor in present-day results, a production of only 137 tons per day (not per shift) per loading machine or conveyor is an indication that much remains to be done in more efficient use of the equipment presently in service. Installation of machines automatically raises productivity but an equal or greater increase can be attained by really using them as they should be. That still is a major task for coal-mine operating men.

The starting point remains, however, the installation of the equipment. Perhaps equally important is its replacement when new machines providing lower cost become available. As a clear statement of the problem and of ways and means of meeting it, the Cowan report merits the closest study and prompt action along the lines of its recommendations if coal is to take full advantage of its present opportunity.



RADIO DRAMATIZES safety meetings and drawings for safety prizes among miners and families of Union Pacific Coal Co.



MAN-TO-MAN TALKS underground personalize safety and encourage cooperation by every Union Pacific miner.

Selling Safety to the Miner

Management and the Union Must Share Alike in Making Miners Safety Conscious—Ten Fundamentals for Setting Up a Sound and Lasting Safety Program—Modern Sales Methods Put Safety Across

By W. A. STANBURY JR.
Assistant Editor, Coal Age

GETTING SAFETY ACROSS to coal miners is not an easy job. Keeping them sold on safety is tougher still. But the outstanding success of some coal-mine managements in plugging safety and turning in good records shows that miners can be sold and kept sold if the approach is right. The right approach calls for (1) a basic program that keeps up a steady barrage of safety talk and training and (2) a standby emergency plan that moves in on special occasions when miner resistance to safety salesmanship is softest. The whole set-up must be based on complete honesty, enthusiasm and skillful promotion by management and dressed up with selling techniques by which safety is sold like soap and cigarettes.

Miner resistance, of course, is the

big roadblock. But it is easy to say the miner's don't-care attitude is of his own making. Sometimes, to be sure, that is true. Likewise, it is sometimes true that his company and his union share the blame for his indifference to safety. Union leaders often throw all the blame for accidents on the company and seldom suggest that the miner has any share in keeping himself safe. Indeed, more interested in keeping miners' pay envelopes fat than in keeping the mine safe, union officials sometimes block management's efforts to penalize workers for safety violations. Thus the union's approach to safety does not often show the rank-and-file miner that he has a share in safety.

On the other side, management does not always create a favorable climate for successful safety sales-

manship. A foreman who fails to enforce safety rules, gambles on "fairly good" roof or "a little bit" of methane, jumps off a moving trip or wears loose clothing underground weakens his company's safety program at the very point where it should be strongest—foreman-miner relations. If top operating management brushes aside the mine safety committee's suggestions or is slow to act on the recommendations of state and federal inspectors, miners themselves can hardly be expected to take much stock in safety promotion. Wherever equipment is poorly maintained, wherever haulageways are littered with loose coal, dust, paper and tools, wherever track is badly laid and derailments are frequent, wherever air courses are allowed to fill up with debris, wherever the mine foreman appears to be skirting the law to save a few cents—there is pretty good reason for a miner to be indifferent to safety.

However, there are a good many straws in the wind suggesting that some union officials are having a change of heart about safety and that lax management, wherever it existed, is being tightened up. Within the last year, it has been reported that local unions in at least two areas are backing up manage-

P. & R. Pete

PRESENTS



1. Obey all instructions given you by your officials.



2. Observe proper rules in wearing safety hats, goggles, respirators, hard-toe boots or shoes, and gloves.



3. Properly examine your working place before starting, and frequently during the shift.



4. Keep all loose material dressed down; never work under loose material.



5. Have your place properly timbered at all times.



6. Keep the line brattice up so ventilation is sweeping the working place.



7. Construct your firing lines and safety breaks properly; guard all approaches to shots.



8. Do not smoke or carry any smoking or flame producing materials inside the mines.



9. Tools and other supplies should not be carried on the shoulder in gangways where trolley locomotives operate.



10. Report all unsafe conditions you observe to your boss as soon as possible.



FAMILIAR CARTOON PERSONALITY, "P. & R. Pete," dramatizes safety for miners of the Philadelphia & Reading Coal & Iron Co.

ment in safety discipline. In the Beckley, W. Va., area, special month-long safety campaigns staged in the summer of 1947 (*Coal Age*, April, 1948) and again in the summer of 1948 signify the growing willingness of the union to work with management in selling safety. There, as well as in other districts, the union, with the help of instructors from state mining departments and the U. S. Bureau of Mines, is sponsoring first-aid and accident-prevention training for safety com-

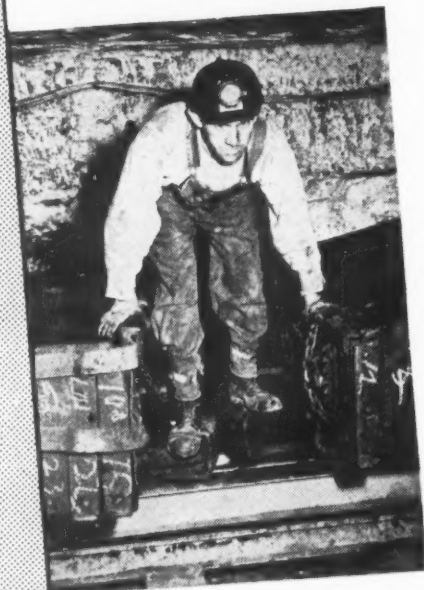
mitteemen and other miners. Joint efforts like these suggest that miners, taking their cue from their union, soon may begin to respond more actively to management's safety promotion. This is only a beginning, to be sure, but it is promising. Management, too, is making good progress. Even those companies with the best safety records, like the Union Pacific Coal Co., Rock Springs, Wyo., realizing that the price of safety is everlasting vigi-

lance, keep beefing up and refining their programs. Companies unable to match records with the best, usually because of difficult mining conditions, lack of enough capital to buy better equipment or failure to get down to work, now are learning how to make their mines safer through their own operators' associations and with the help of state and federal inspectors and the newly created Safety Department of the National Coal Association. In some areas, in fact, they are

Consolidation Coal Company (Ky.)

SAFETY—UP TO DATE

Sam Chance, boom man, Mine 204, says smart men dress properly on the job to cut down the possibilities of injuries. Not much chance of snagging and falling here as Sam crosses thru a standing trip.



Deggone These Bell Bottom Trousers!

Sam shows here what could happen when loose clothing is worn.



1948												APRIL												1948												2ND HALF	
1ST HALF				SUN.			MON.			TUES.			WED.			THUR.			FRI.			SAT.															
1st SHFT	2ND SHFT	3RD SHFT	1st SHFT	2ND SHFT	3RD SHFT	1st SHFT	2ND SHFT	3RD SHFT	1st SHFT	2ND SHFT	3RD SHFT	1st SHFT	2ND SHFT	3RD SHFT	1st SHFT	2ND SHFT	3RD SHFT	1st SHFT	2ND SHFT	3RD SHFT	1st SHFT	2ND SHFT	3RD SHFT	18													
2																								17													
3																								16													
4																								19													
5																								20													
6																								21													
																								22													

SAFETY CALENDARS provide a daily safety reminder for miners at Consolidation Coal Co. (Ky.). Hanna Coal Co. and others also find them useful for personalizing and localizing safe work practices.

seeking and getting more help from both district union officials and the local safety committees.

Even with improvements registered along these lines, however, there still remains the problem of miner indifference growing out of his own experience and day-to-day feelings. For one thing, data from the U. S. Bureau of Mines indicate that a miner learns a good deal about safety in his first five years but that he does not become a safer worker in the next 15 years following his first five. That is another way of saying that miners after a time become so familiar with the hazards of their job that they grow careless or indifferent. On the other hand, new men are more likely than anybody else to get hurt. The reason for this may be any one of sev-

eral—inexperience, willingness to take a chance or lack of proper instruction by their foreman.

Besides these, there are other reasons why miners grow indifferent to safe work practices. To mention only a few: poor labor relations due to poor leadership in the local union or to management's failure to improve working and living conditions; the threat or likelihood of nation-wide stoppages, accompanied by top-level union attacks on mine management; personal friction among the crew members growing out of inferior foremanship or the presence of a single trouble-maker; incomplete or lackadaisical instruction in safety by the foreman; willingness to gamble; and domestic or other off-the-job troubles, such as debts, family sick-

ness, neighborhood feuds, nagging wives, etc.

Barriers like these are pretty formidable, not only because they are numerous and complex but also because they are never the same on two successive days. Tuesday's obstacle may be replaced by an altogether different obstacle on Thursday. That is why an effective safety program must work continuously with a broad sweep and must be designed to cope with changing conditions and moods. It takes a sharp eye and a lot of fast jumping on the part of those responsible for safety, plus a lot of flexibility in salesmanship techniques, to meet each new situation as it arises.

Creating a safety program that meets all the needs all the time requires the following:

1. Steady campaigning—Something about safety has to be going on all the time to keep safety always in the minds of miners. The secret of keeping the program lively and the miners interested lies in a varied approach—serious and humorous, statistical and argumentative, instructive and menacing—exploiting all the communications channels available and snatching at every new “angle” that turns up around the mine—the introduction of new machinery or equipment, the start of a new man on the crew, the opening of a new territory or a change in the mining plan, a change in roof or bottom conditions, an accident, a narrow escape from an accident or a mistake witnessed by the foreman.

Naturally, this approach, geared to special incidents, must be in addition to a steady, running drive on safety in the ordinary day-by-day operations around the mine—timber setting, machine operation, running a locomotive, handling a drill and dressing for work, to mention only a few. Along these lines, a “how-to-do-it” approach has had notable success in a series of “The Safe Way” articles running from month to month in the *Lorain-Lorain Journal* of the Lorain Coal & Dock Co., Columbus, Ohio. A similar approach by the Hanna Coal Co., St. Clairsville, Ohio, is made through the monthly mailing of a calendar to all employees, with right-way and wrong-way photographs of various jobs around the mine. Those issuing annual “right-and-wrong” calendars include Consol of Kentucky. The safety activities of these companies and others like them are not limited to these approaches. They are cited simply to show how steady plugging at regular intervals through several channels is an essential part of a broad, basic safety program. In the words of officials of The Union Pacific Coal Co., safety is “a major project, requiring 24 hours daily of each week, month and year, vigilant and intensive action . . . in every office, shop, tippie, slope, entry and room. . . . Every workman must be taught to live safely, think safely and act safely.”

To build up a steady drum-fire of safety and keep the program going, a good many companies have set up safety departments or employed full-time safety engineers. The Continental-Archbald Coal Co., Scranton, Pa., for example, has a full-time safety engineer to guard the health and safety of workers and to make frequent underground and

surface inspections. He is vested with full authority to oversee the correction of any hazard he discovers. The Safety Department of The Union Pacific Coal Co. is a division of the General Office comprising two engineers and sometimes three whose shifts are arranged to provide round-the-clock inspection of all working places and who, though working in the mine through the operational staff, have complete authority to adjust operations underground and on the surface.

2. Far-reaching communications

—A strong safety program must have a communications system that reaches, at frequent intervals, all those who have an interest and a share in safety—miners, surface workers, supervisors and their families—at work and at home. Every possible avenue must be exploited—the company newspaper or magazine, conferences of small groups led by foremen, big meetings dramatically staged to attract miners and their families, radio programs, special mailing pieces sent to workers’ homes, bulletin boards in washhouses and lamp-houses and newspaper advertising, to mention only a few. The Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., for example, mails monthly leaflets, many of them about safety, directly to miners and their families at their homes and to business concerns and community organizations in the area. One of the most successful of these leaflets included the company’s “Ten Commandments of Safety,” quoted in full elsewhere in this article. These leaflets are supplemented by a regional radio program that stresses, safety, productivity, etc. The Union Pacific Coal Co., with meetings, prizes, first-aid contests and safety-slogan competitions, publicized in “The Bugduster’s Safety News,” in local newspapers and in radio broadcasts, reaches not only miners underground but also Boy and Girl Scouts, at school and play, and wives and mothers in the home. The technique of both companies is to keep safety coming at miners and their families from all directions. Many other companies are doing the job in much the same way, with equally encouraging results.

3. Formal training—On-shift and off-hour instructions by qualified persons—safety engineers, mine foremen, superintendents or experts from state and federal bureaus—is a primary requirement.

Special weight should be given to training new employees in safe work practices before they go underground. For instance, the Island Creek Coal Co., Holden, W. Va., holds special pre-job meetings for new men in the company offices, where officials discuss safe work habits and answer questions. The company also makes good use of colored slide films showing local men at work in local mines. Officials at mines of Eastern Gas & Fuel Associates near Kimball, W. Va., make much the same use of color motion pictures taken in local operations. Both companies make these same films available also to old hands. Pre-job instruction also is provided by The Union Pacific Coal Co., which furnishes each new worker with a book of rules which is “must” reading to all new employees, regardless of previous experience. Safety men at the Gorgas mines of the Alabama Power Co. take new men on a mine tour and then hold classes in safety topped off by first-aid training.

Pre-job training naturally must be followed up by close supervision and practical instruction in the working place until the new man shows that he can do his work without endangering himself or his fellow miners. Pre-job and follow-up instruction is best done by local mine officials and supervisors, who know local conditions and local work practices and rules and who can keep teaching on a personal basis, thus getting off to a good labor-relations start with new men as well as securing their future safety.

Accident-prevention and first-aid classes for old hands, as well as courses leading to certification as foreman, should be kept running steadily, as they are by the Hanna Coal Co., with periodic starts for new classes to enable interested miners to enroll. Here, in addition to instruction by experienced local men, the technical help of outsiders like safety specialists from federal and state bureaus can be used to good advantage.

4. Good record-keeping—Records make a strong prop for safety if they clarify weak points in the safety organization and danger points in the operation. Good records, with full cross-indexing, should classify accidents as to: (1) name of man or men involved; (2) reason, whether carelessness or ignorance on the part of workers, faulty maintenance of machines or equipment, breakdown in supervision or natural conditions beyond

anyone's control; (3) place where the accident occurred; (4) any special circumstances contributing to or accompanying the accident; and (5) the way the accident and casualties were handled. A good many companies, including the Continental-Archbald Coal Co., keep records along these lines and thus are able to tag miners especially susceptible to accidents, faulty or dangerous equipment and machinery, types of work that are peculiarly hazardous, locations where danger lurks or foremen whose safety supervision is weak. With weak spots identified and localized in these ways, immediate corrective action can be taken, such as changing a miner to a job better suited to his ability or even discharging him as unsuited for mining; replacing equipment or setting up a more efficient maintenance schedule; disciplining a foreman or revising his instructions; changing the mining plan or even abandoning a section as unsafe. Well-kept records will blueprint the kind of action needed.

5. Constant review of mining methods and day-to-day conditions

—Mining conditions can change radically within a very few feet. Wide-awake management officials, from the top on down to face bosses, always are alert to these changes and are prepared to adopt new practices to meet new conditions in the interest of safety. Frequent and periodic patrols of the mine by safety specialists, together with even more frequent reports by face bosses to the mine foreman, are the best ways to keep danger at arm's length. In addition, foremen and face bosses should be drilled in the kind of thinking that meets any situation quickly and effectively.

Review of mining methods is a joint task for everybody. In the engineering department, it means better planning of room entries, haulageways and air courses. In top management offices, it means quick adoption of new safety devices and equipment. For miners, face bosses and everybody else, it means free play of the imagination to improve the safety factor by changes in machines, job sequence, timbering, etc., and quick action to correct reported hazards.

In this connection, management and miners alike can profit from a well trained and cooperative mine safety committee. Each week, for example, a committee of miners at the Continental-Archbald Coal Co. meets with an official in each section to discuss each accident during

the preceding week—if there was one—and to make recommendations to prevent similar accidents. Officials welcome miners' suggestions offered at these meetings and a co-operative spirit prevails. The result, of course, is a better safety record for the company, based in some degree at least on improvements suggested by the men who are closest to danger.

6. Good equipment, well maintained—Exposed conductors, worn cables, light-weight track, loose rails and switches, littered haulageways, loose bolts, "baling-wire" repairs, out-dated fans, worn wheels, mine cars with torn or jagged edges, broken car couplings, burned out locomotive headlights—these are only a few of the hazards to life and limb that are easily corrected by replacement or a regular maintenance routine. An inspection and overhaul schedule calling for periodic checkups on equipment items and providing for quick emergency repairs by skilled workmen, is a big factor in safety as well as worker morale.

7. Firm discipline—The first objective of safety training and promotion is to inspire willing and automatic compliance by miners. Discipline does not necessarily mean punishment, though some kind of penalty occasionally may be necessary to get a point across. Discipline does mean instinctive obedience to rules and habitual use of safe work practices. It is created by training men so effectively that their responses to danger are automatic and their movements about the mine are always self-protective. In this respect, safety discipline is close to military discipline and it grows, like military discipline, out of constant repetition and drill.

When punishment is needed, it always should follow a full explanation showing the culprit where he was wrong and why he is being penalized. If management's approach to safety discipline and penalties follows this pattern, the co-operation of the pit committee and the union may be easier to win.

8. Teamwork and individual responsibility—A safety program must enlist the help of everybody—miners, management and the union—for the sake of everybody. The carelessness of one man or the indifference of one group can destroy the best-laid program. Good safety work comes down to the kind of teamwork that wins a pennant for

a ball team—each man takes care of his own corner of the ball park and, in addition, like the catcher and the first baseman, backs up the other fellow when he needs help. Likewise, miners, management and the union have their own jobs cut out, but the teamwork grows out of pulling together. With more and more miners being trained by safety instructors from state and federal mine bureaus, backed up by local managements and district union officials, teamwork like this is becoming easier.

9. Complete honesty and lively enthusiasm by management

Company officials, as they have done in the past, must continue to set the pace in safety campaigning. But it is not enough to set aside the money for promotion, buy the equipment, set up the organization, lay down the policies and make the rules. To put safety across, top officials and others must show their solid backing for safety by appearing personally at safety meets and safety conferences; visiting underground with miners at the working places; personally inspecting air courses, timbering and track and issuing on-the-spot orders for improvements to make work safer; inviting frequent conferences with the mine safety committee, listening sympathetically and acting promptly on their complaints and suggestions; and making it clear to every worker that his safety is the first consideration in mining coal.

10. Appeal to all motives—No two men respond alike to the same motives. Thus, to get next to every man on the job, safety promotion must be geared to appeal to all the motives that prompt men to action. The men who are responsible for safety therefore should be sure that the drive for safety is based on the following:

Love—Love of family and home, love of work, love of money, etc.

Fear—Fear of death and pain, fear of loss of limb or sight, fear of punishment, fear of loss of earnings.

Pride—Pride in job, skill and strength, pride in high earnings, pride in crew and company, and pride in outstripping others.

Hope—Hope of reward or recognition, hope of promotion, hope of security, long life and good health.

The ten principles previously discussed are essential to a sound safety program. However, simply setting up the framework and sys-

tematically going through all the motions is not enough. Safety has to be kept lively and interesting enough to overcome sales resistance on the part of miners. That means aggressive salesmanship employing much the same bag of tricks that soap and cigarette merchandisers find so effective, plus whatever sales tricks of their own coal men can rig up. Some of these sales methods are as follows:

DRAMATIZE IT—Slides and movies showing local miners in local mines, like those already referred to at operations of the Island Creek Coal Co. and Eastern Gas & Fuel Associates, build flesh and blood around safety principles. Also helpful in dramatizing safety are cartoon characters in company publications and on safety posters, like "Picco" of the Pittsburgh Coal Co., Library, Pa.; "P & R Pete" of the Philadelphia & Reading Coal & Iron Co.; and "Safety Sammie" of the Hanna Coal Co. In addition, "The Safe Way" photo series of the Lorrain Coal & Dock Co. and the Hanna and Consol safety calendars have a dramatic appeal of their own in showing first how not to do a job and then showing how it should be done.

Size itself often is a factor in dramatizing safety. Big events, like the safety meets staged by The Union Pacific Coal Co., the Hanna Coal Co., and the union and operating companies in the Beckley, W. Va., district, draw large crowds of people, including miners, their families and other interested people in the area, into a day-long outing in the interest of safety. Big-time prizes for winning teams add punch to these meets and radio broadcasts, like those of The Union Pacific Coal Co., dramatize the contests and the crowds for people unable to attend.

PERSONALIZE IT—The personal relationship is a key factor in successful safety salesmanship. Man-to-man contacts between supervisors and individual miners encourage personal acquaintance and understanding and pave the way for willing acceptance of safety. Through personal relationship each miner begins to feel that his personal safety is the special concern of his management.

INDIVIDUALIZE IT—This means gearing the selling technique to that one motive that provokes the best response from each individual. It calls for a thorough knowledge of each individual miner and a thorough understanding of

his hopes and fears. In all selling, whether it is soap or safety, the salesman first sizes up his prospect and then adapts his technique to the man he is dealing with.

LOCALIZE IT—Company publications, calendars, posters and films picturing local faces and familiar places really bring safety down to local terms and give it added meaning. In safety meetings, calling the names of men who have had accidents and describing the place where accidents have occurred brings safety close home to miners. In contacts underground, pointing out nearby dangers and correcting mistakes on the spot builds safety up into something more than "just what the boss talks about all the time."

DEMOCRATIZE IT—It should be easy for every man to get a hearing on safety. The Union Pacific Coal Co., for example, depends on an organization of small groups to make it easy for every man to speak his piece. Likewise, the Hanna Coal Co. requires brief weekly meetings of underground crews, each conducted by its own foreman, for discussing safety and gathering suggestions from miners. Minutes of these meetings are then sent to mine officials, who act on the suggestions and complaints noted in the minutes. Much the same sort of meetings are held in mines of the West Virginia Coal & Coke Corp., Omar, W. Va., and the minutes of some are published in the company's monthly news bulletin. An approach like this makes every worker realize that his contribution to safety is substantial and is, therefore, welcomed by management.

SYNCHRONIZE IT—Alert safety campaigning calls for snatching at every incident around the mine that offers an opportunity to sell safety. For example, the safety director of the Big Sandy-Elkhorn Coal Operators Association moves fast whenever an accident occurs in one of the field's mines. Within a short while after the accident—as soon as posters can be printed and while the accident is still fresh in the minds of workers—a full description of the accident and its cause is posted on bulletin boards around the mines (*Coal Age*, May, 1948, p. 132). Likewise, The Union Pacific Coal Co. calls a monthly safety meeting of all hands, not only to show safety films and talk about safety in general, but also to review the accidents of the past

month. The safety director gives names and tells the place and time of each accident, tells how it could have been avoided if the rules had been followed and asks for discussion of the accident by miners attending the meeting.

As pointed out earlier, there also are other day-by-day incidents around the mine that makes safety-selling easier—hiring a new man, introducing a new man to the crew, bringing new machinery or equipment into the mine, changing the mining plan or witnessing a mistake or narrow escape. At these times, when resistance to safety salesmanship is likely to be lowest, there is always a good chance to put safety across. Flexibility in selling methods and quick action on the part of management are required.

RATIONALIZE IT—It is not enough to tell a shooter not to tamp with bug dust. He is likely to cooperate better if he is told why. To be sure, there are some men who insist on learning the hard way—by experience. In a coal mine, however, learning by experience may mean blindness or loss of an arm. That is why it is important to stress the "whys" of safety to miners. The consequences of carelessness must be made clear and graphic before an accident occurs—not afterwards.

MEMORIZE IT—Safety has to be repeated again and again in every possible way until it becomes as familiar as "LS/MFT" and "Duz Does Everything." The aim is to keep every worker so safety-conscious that he reacts automatically to any danger signal and complies willingly and even subconsciously with all safe-work practices.

A safety program that reaches all the people interested in safety, reaches them all the time and reaches them through imaginative and aggressive salesmanship, is the best way to improve a coal company's safety record and, by the same token, the record of the industry. The gains for everybody are worth working for. For miners, a better record means longer life and better health, higher earnings and better jobs, not to mention a more stable pension fund due to fewer payments for disability. For the company, it means better morale and better labor relations with workers, higher productivity, lower compensation rates and better public opinion of the company and the coal industry.



PORTAL FACILITIES are concentrated at the Pratt-seam openings and include shops and warehouse, bathhouse, office, sand house and Pratt-seam coal and rock dumps, with rock conveyor extending out to the right.

Modern Mining at Gorgas

Crawler Loaders, Belts and Shakers Supplemented by Mechanical Cleaning in a Rounded Program of Efficient Production at New Gorgas Mines—Housing, Recreation, Welfare and Safety Stressed in Planning

BUILT FROM the ground up since 1941, the Gorgas mines of the Alabama Power Co., Gorgas, Ala., are now supplying the Gorgas steam plant with over 2,000 tons of washed coal a day from three openings in two seams, 54 to 60 and 30 to 36 in. thick, separated by an average interval of 61 ft. Crawler loaders served by belt and chain conveyors are employed in the lower and thicker seam and, at present, hand-loaded shakers in the upper and thinner coal, where very bad top conditions prevail in the present working areas. Coal from this upper seam is stored in a special hopper and, on the third shift, is fed into cars in the lower seam by an electric-eye-controlled reloading station. Rock from this upper seam is disposed of by an automatic electric-eye-controlled feeder and belt.

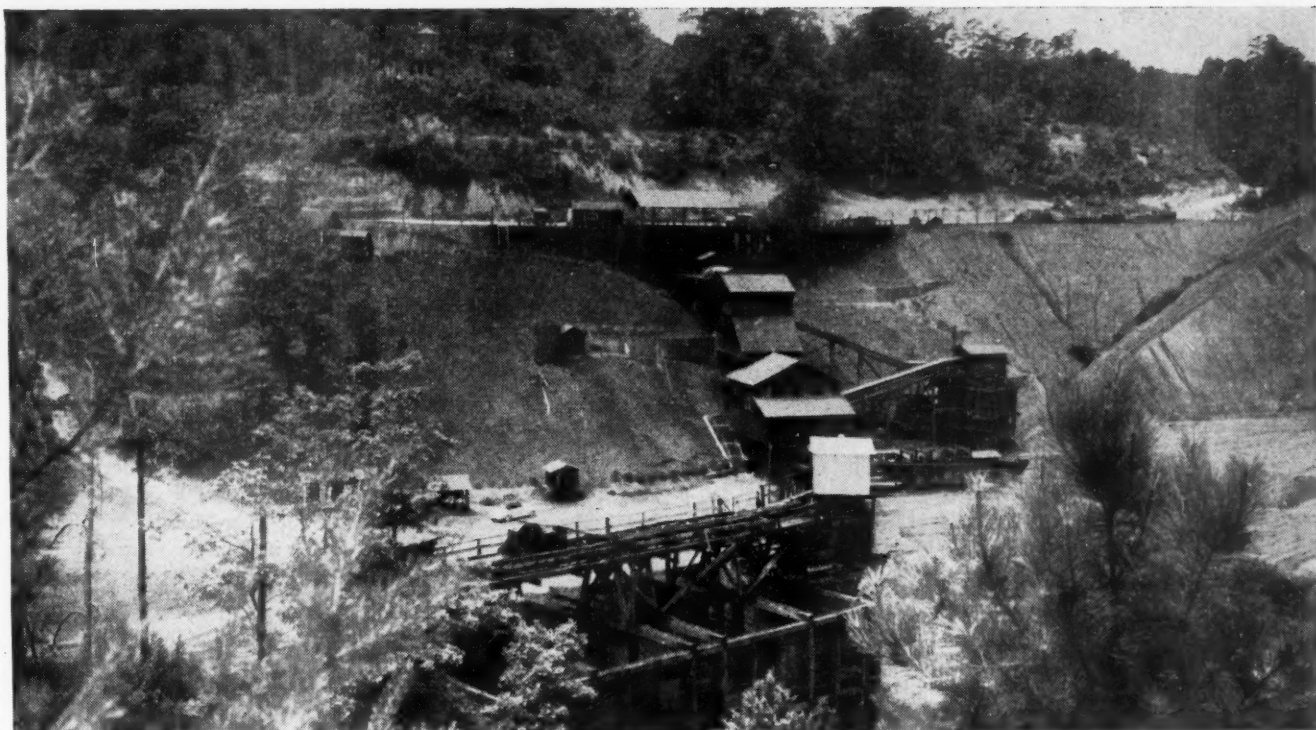
The Gorgas mines have been developed in 19,296 acres on Mul-

berry Fork of the Warrior River in Walker County, Alabama, adjacent to the Gorgas steam plant. This acreage was taken over by the Alabama Power Co. Sept. 22, 1940, from the Southeastern Fuel Co. Work was immediately begun on plans for portals in the America and Pratt seams adjacent to the abandoned Southeastern Fuel Co. workings. By December, 1940, it had been decided to name the active portals for the new Gorgas mines America 2 and 3 and Pratt 3 and 4. On June 3, 1941, excavation started on the Pratt openings. On June 28, 1941, clearing of the site for the tippie and washer was begun and the first coal was dumped and washed Dec. 16.

On April 20, 1943, excavation for the America No. 2 opening—now used only to transport supplies underground—was begun. The first coal was run out of America No. 3

—now the main haulage portal—on Nov. 15, 1943, and on Nov. 15, also, the America No. 1 portal, leading into an older mine, was abandoned. The first coal, however, was not mined in America No. 3 until Sept. 8, 1944. On Nov. 1, 1944, Pratt No. 4 was started. Meanwhile, on Jan. 24, 1944, the mines went back to two-shift operation, which still prevails, the third shift being reserved for supply and maintenance and preparation of Pratt-seam production. First coal was produced from Pratt No. 4 on Aug. 16, 1945.

Along with mining facilities, Alabama Power officials also went heavily into improvements of the mining community, including the construction of a swimming pool, barbecue pit and picnic ground, playgrounds, and so on. In 1945 all existing houses were remodeled. This remodelling included installing new and complete kitchen facilities and complete baths, putting in new floors, doing other repair work as necessary and completely refinishing the interiors. A number of new houses also have been built, including eleven for sale to employees. These new additions were laid out by a noted consulting landscape and community engineer.



GORGAS WASHERY and washed-coal storage bins. Raw coal dumped in the bin on the other side of the valley is broken down and washed and then carried by conveyor to the washed-coal storage bins in the foreground.

Alabama Power provides \$500 worth of life insurance free to employees with six months of service, the total increasing to \$2,500 at the end of ten years. A company-paid pension plan also is in effect, although its fate, as far as mining employees are concerned, is speculative in view of the health and welfare fund.

Proper introduction of new employees to their work, with particular emphasis on safety, is a subject of major emphasis by Gorgas mine officials. New employees must pass a physical examination and stand an investigation of references. When hired, they spend two days in the company of the safety director, his assistant, or some other mine official. In those two days they are taken over the mine and the work and the equipment are explained to them, after which they go to safety classes. Then they start work. As soon as six new employees, or enough for a first-aid team, are on the job, all six are brought out and given five days of first-aid training, making in all seven days of training and instruction with pay.

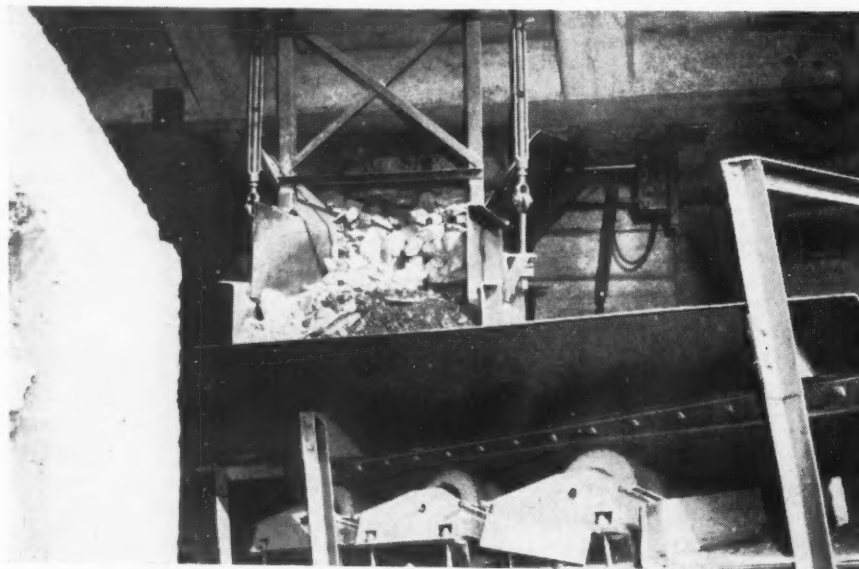
Gorgas mines were 100 percent safety hats in 1947, 65 percent safety shoes and 10 percent goggles. Rock dust used per ton of washed coal was 2.023 lb. in 1947, and one timber was set for each 5.09 tons of washed coal. All new



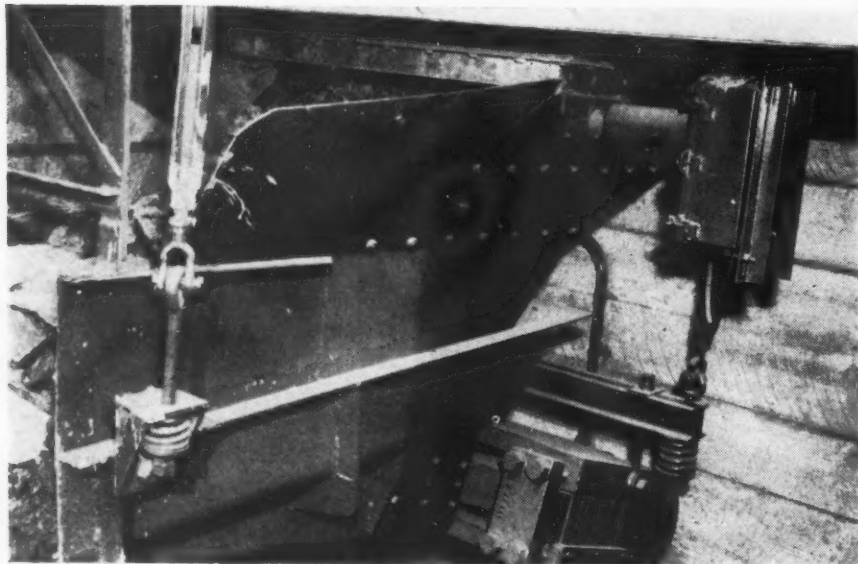
MODERNIZATION AT GORGAS included remodeling all existing houses and building a number of new units, such as those in the top photograph. Below is the community swimming pool, with barbecue pit on the shore in the distance.



PRATT-SEAM ROCK DUMP and conveyor at the right; coal dump at the left. Both are arranged for automatic handling, using feeders controlled by electric eyes.



AUTOMATIC FEEDER belt disposal of Pratt-seam rock. An electric eye starts or stops the unit automatically, depending upon whether there is rock in the feeder throat.



CLOSE-UP OF VIBRATING FEEDER for handling Pratt-seam rock. The electric-eye target is at the upper right, with the beam coming through the throat from the opposite side.

equipment is permissible and safety facilities include six mine-rescue apparatus, four first-aid stations underground, two first-aid stations on the surface, a Fyr-Fyter truck kept at a strategic location near all portals, Wheat electric cap lamps, permissible explosives, four 28-men covered man-trip cars (Southern Car & Mfg. Co.), with others to come, and so on. The Fyr-Fyter engine includes a small rubber-tired chemical unit that can be pulled into a trackless section or under low top. Rock dusting is done every day, using M-S-A Bantam units with rubber tires in trackless areas. Dusting is never permitted to get over 40 ft. back of the face. Rock dust and hand extinguishers are kept at strategic spots all throughout both mines.

The Pratt and America seams being mined at Gorgas occur near the tops of the hills and dip very slightly to the southwest. The Pratt, or upper seam, as previously noted, is 30 to 36 in. thick, including some 2 in. of slate and bone. Average cover over the Pratt is 150 ft. The America, or lower, seam is 54 to 60 in. thick, with the cover averaging some 210 to 220 ft. It includes about 4 in. of bands.

The Pratt top is variable and bad. It usually consists of a light-gray rotten slate with laminations of bone or coal through it. Thickness of this slate runs from 3 to 7 ft. and it is extremely hard to hold with any kind of timbering. For that reason use of duckbills was discontinued in favor of hand loading onto shakers in rooms because of the difficulty of operating with the heavy timbering required. Duckbills, however, are used in driving headings and loading bottom rock for height in haulage-ways.

In developing in the Pratt seam the three headings making up an entry are driven up shaker length. Then work is started in rooms while rock is taken in the haulage road. Some 2½ ft. of bottom is shot, using one air compressor and pneumatic drill, and is loaded into cars by a duckbill.

Rooms in the Pratt seam are at present worked in groups of three, each with a Goodman or Ladel shaker. The three shakers discharge to a chain-type gathering conveyor, which feeds the coal into cars on track turned into an outby completed room. Five men comprise a crew—machine-man and scraper, shotfirer and panman, timberman and general man. All, of course, load coal when coal is ready and

they have no other duties to perform.

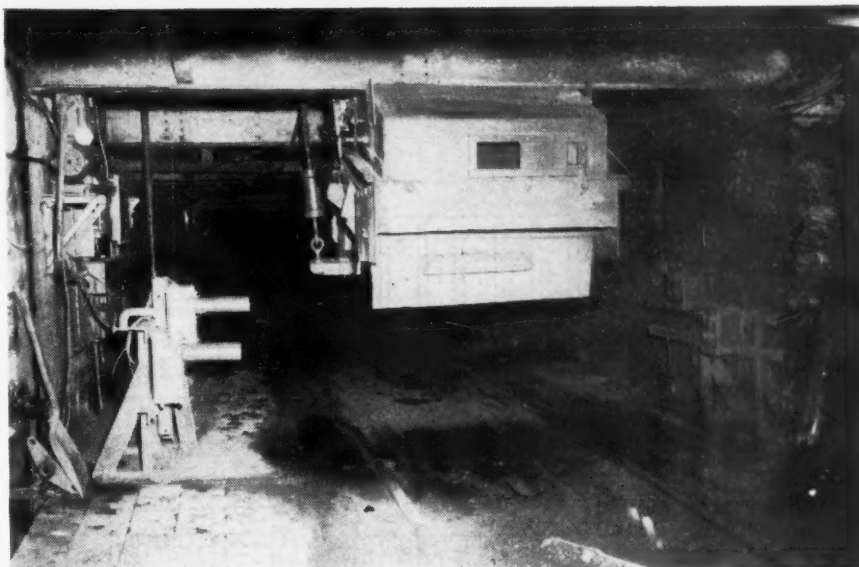
Rock from the Pratt-seam workings is dumped from the drop-bottom cars into a concrete bin with a capacity of five cars, and from then on is handled automatically by an electric-eye-controlled feeder and belt conveyor. The electric-eye beam, as shown in the accompanying illustrations, shines through the feeder throat when the bin is empty. When a car of rock is dumped in, it fills the throat and interrupts the beam. Relays then start the rock conveyor—a Continental Gin Co. unit with a 30-in. Goodyear belt—six seconds ahead of the Jeffrey-Traylor vibrating feeder. The rock conveyor is 310 ft. long on an inclination of 12 deg. and operates at a speed of 150 f.p.m. It is driven by a 15-hp. General Electric motor.

When the rock is drawn down so that the light beam can shine through the feeder throat, the feeder stops. The belt, however, continues to operate for 168 seconds, or long enough to run all the rock out. When sufficient has accumulated on the dump, the rock is spread with a bulldozer. Once the electric eye is turned on and warmed up, rock disposal is completely automatic, the equipment operating only when rock is dumped.

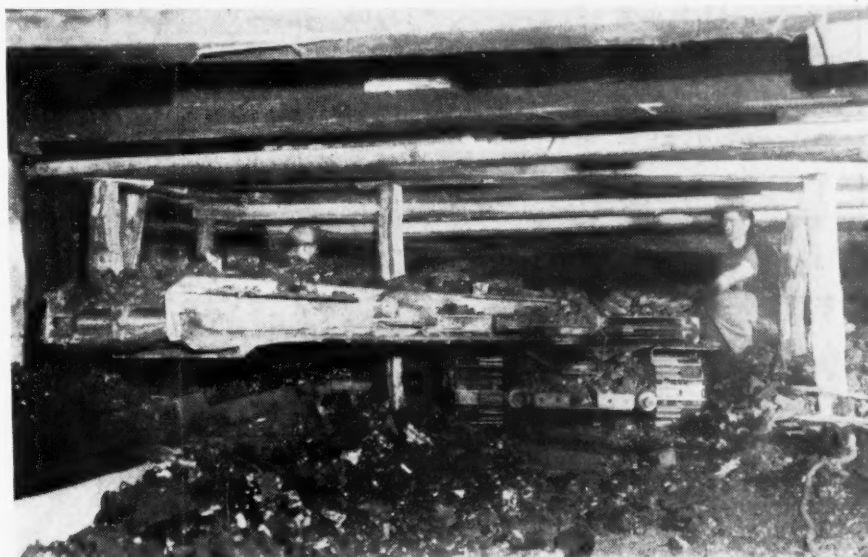
Coal from the Pratt workings also is handled in similar fashion for preparation on the third shift. On the first and second shifts it is hauled to the surface by 6-ton Goodman locomotives and dumped from the drop-bottom cars into a 500-ton coal hopper adjacent to the rock hopper. The coal hopper was built by excavating in the side of the hollow below the Pratt-seam openings. The bottom is natural rock on a 1:1 slope and the sides are concrete. The hopper terminates in 14x14-ft. square feeder shaft, or throat, down to a trip-loading side-track in the America seam below.

Trip-loading and handling facilities in the America seam (see accompanying illustrations) include a Jeffrey-Traylor coal feeder, a chain-type trip feeder and a double electric-eye installation. The two eyes actuate controls which cause the chain to move the trip forward car by car and spot exactly for loading. When loading is completed, the trip is moved ahead so that the last car clears the chain, after which the unit is shut off automatically. Time for moving up and loading a car is approximately one minute.

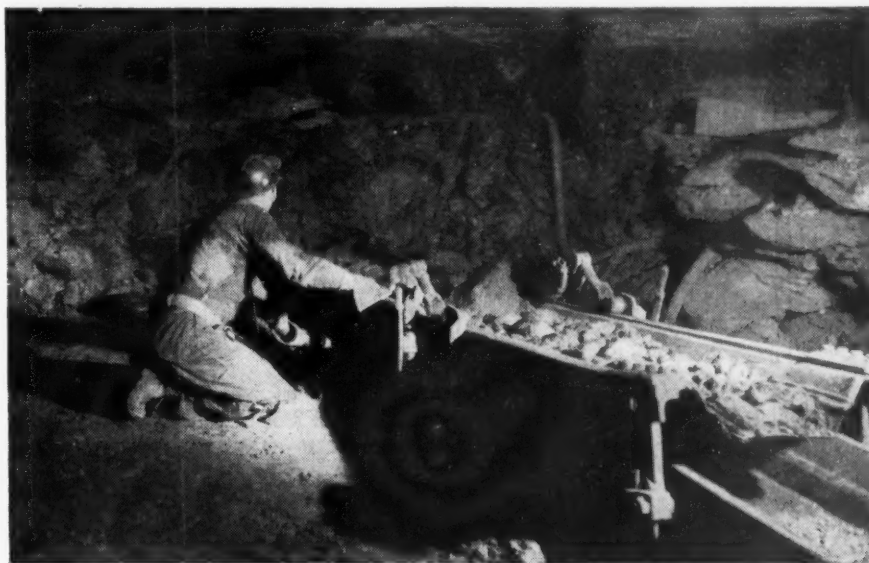
The top over the America seam



VIBRATING FEEDER for reloading Pratt-seam coal underground in the America workings. Dual electric eyes position mine cars and start and stop feeder automatically.



AMERICA COAL is handled by crawler loaders and room conveyors feeding to mother belts and 6-ton mine cars.



PRATT COAL is produced by snaker conveyors. A duckbill unit is shown here loading bottom rock in a heading.

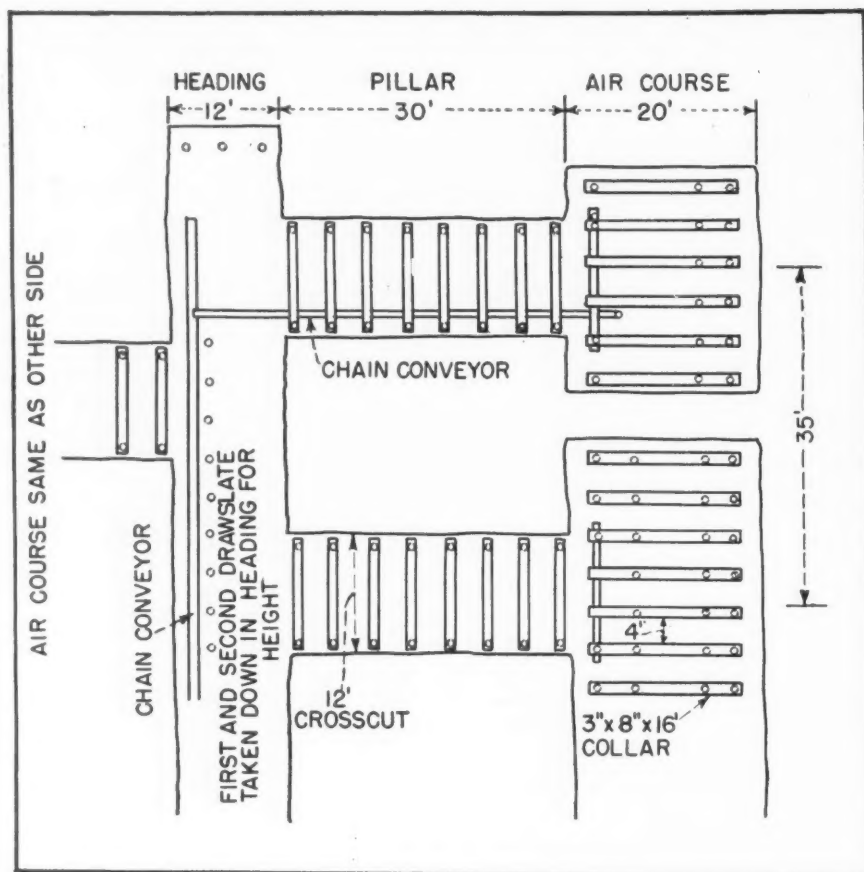


FIG. 1—TIMBERING and chain-position plan for driving main entries.

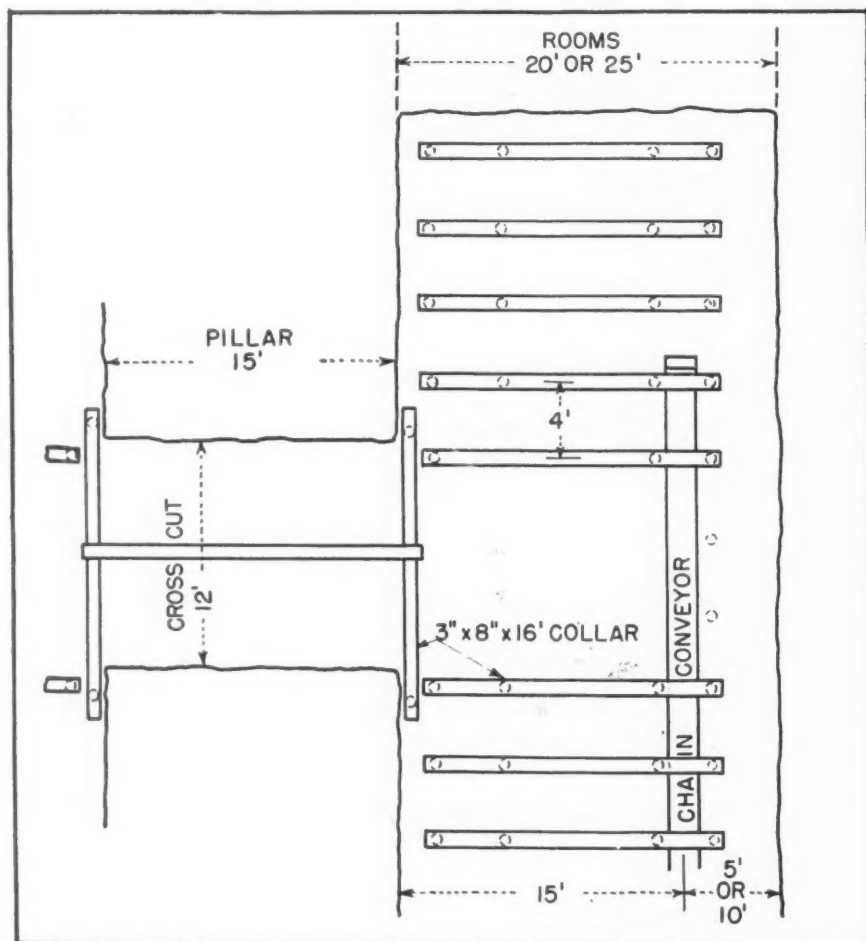


FIG. 2—ROOM AND CROSSCUT timbering plan in the America seam.

at Gorgas mines consists of two layers of drawslate followed by hard sandstone. The first, or lower, draw ranges from 0 to 8 in. thick. Thickness of the second, or upper, draw is 8 to 30 in. Both are taken down on main tracked haulageways. On belt entries the first draw is taken, but the second is held, where possible, by posts and crossbars. In rooms, all the drawslate is held by crossbars if at all possible to eliminate having to load and handle it to the outside.

Fig. 1 shows the timbering pattern employed in driving a main entry where track is to be laid in the center heading. The chain conveyor in the center heading feeding the coal back to a car-loading station is laid on one side of the place. The coal is shot and loaded first if the first and second draw stays up. If not, everything is loaded together. Since the draw is taken to the solid top, only safety and temporary posts are set along the chain conveyor and at the face. By keeping the conveyor on the side of the heading it is possible to lay track as the face advances, eliminating the wait that otherwise would be necessary in the course of moving up.

Aircourses on both sides of the haulage heading and the crosscuts between them are, as indicated in Fig. 1, timbered heavily with crossbars to hold the drawslate and provide ample protection. The practice is to develop the aircourses from the crosscuts. In other words, a crosscut is driven across to the aircourse rib line. Then cuts are made both ways to connect to that part of the aircourse already driven and ahead halfway the distance to the next crosscut. In this way it is not necessary, in view of the short distances between crosscut centers, to use conveyors in the aircourses, since the loading units can easily reach the crosscut conveyors.

Both drawslates, as noted, are held on 3x8-in.x16-ft. crossbars on 4-ft. centers in rooms. At least three posts must be used under each bar at all times. Usually, the number is four. Plans call for 'using aluminum bars in the face zone when they can be obtained in the necessary quantity. Fig. 2 shows the usual room timbering plan. The conveyor is laid along one rib and the legs are set under the bars to leave an open machine travelway in the center. To provide free access to the crosscut, the room bars are omitted at this point and single posts are substituted. To keep the crosscut clear and still prevent the

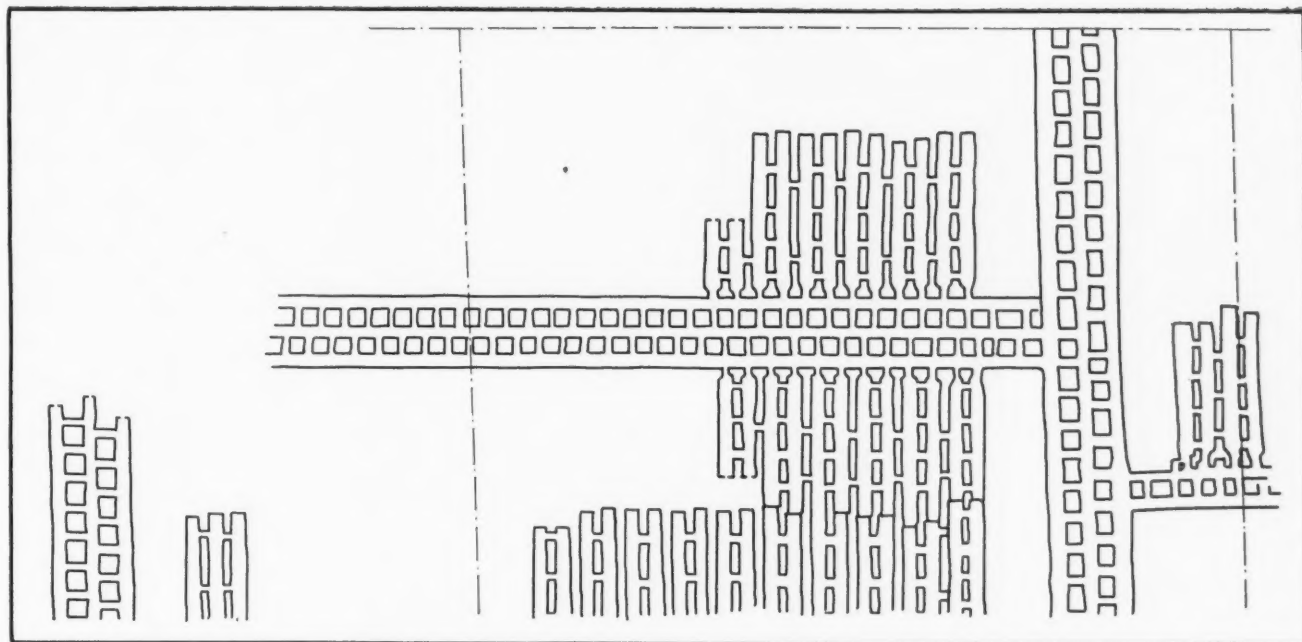


FIG. 3—STANDARD PANEL WORKING PLAN employed in the America seam.

drawslate from breaking in the middle and coming down, a bar is set down the center, as shown in Fig. 2, resting on other bars at each end. Bars are set to the face in each room as the coal is loaded, and legs are removed and reset as necessary during cutting.

Except for some duckbill output, the production in the America operation at Gorgas mines is handled largely by Joy 12 BU loaders and Joy and Jeffrey chain conveyors feeding either to cars or to belt conveyors. Three 1,500-ft. conveyors equipped with Goodyear and U. S. Rubber belts were in service in the America seam at the time this article was prepared. Two were Goodman and one was Ladel. Trips are handled at belt discharges and at other loading points by Stewart and Continental Gin car-spotting hoists. Ropes are pulled back by hand to couple to new trips dropped into belt-head sidetracks.

Two rooms comprise the usual set-up in the America seam. In addition to the loader and two room conveyors, equipment for a set-up includes a 50-hp. 7-B or 11-B cutter with 7½-ft. bar (plain bits) and one Jeffrey A-7 or Chicago Pneumatic 572 hand-held drill. Kennametal bits are being installed for drilling after first use in rock. Loader and cutter alternate between the two places.

Where the coal goes to a belt, the standard crew for a two-room set-up is seven men—loader operator and helper, machineman and helper (who also drill), two timbermen (one with each machine) and a shotfirer. If the unit is delivering

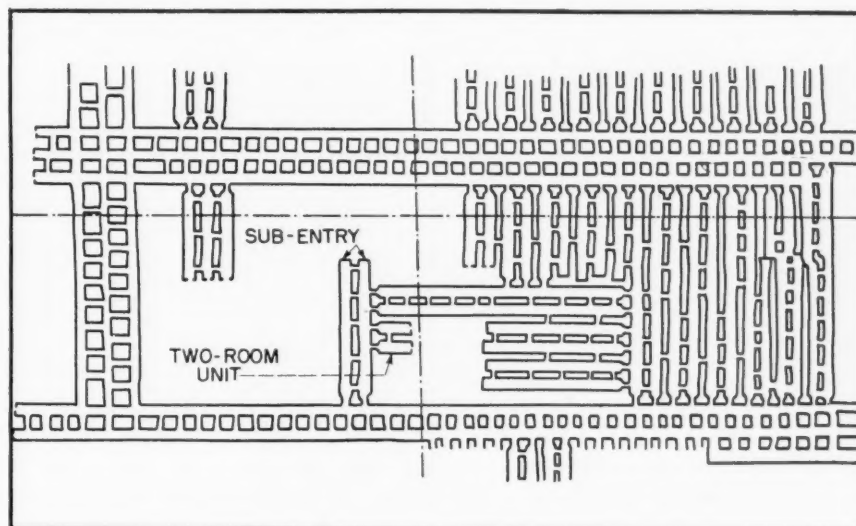


FIG. 4—SUB-ENTRY PLAN for use where falls occur in aircourses, America seam.

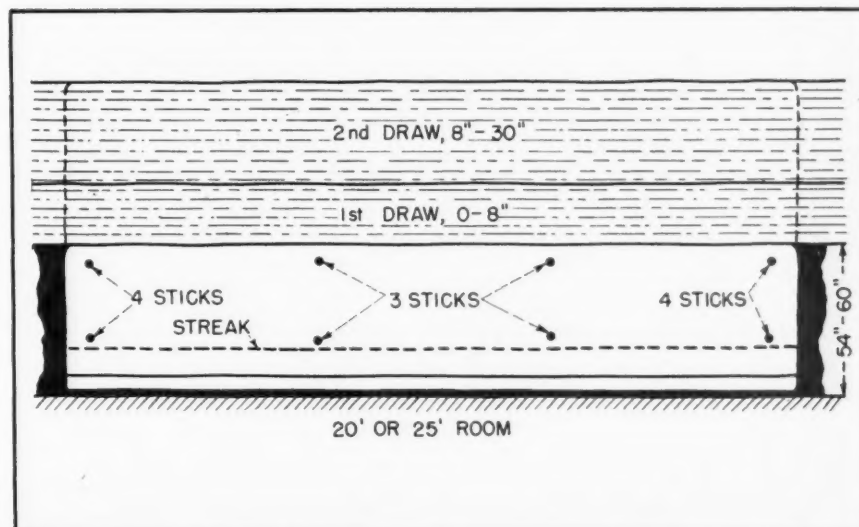
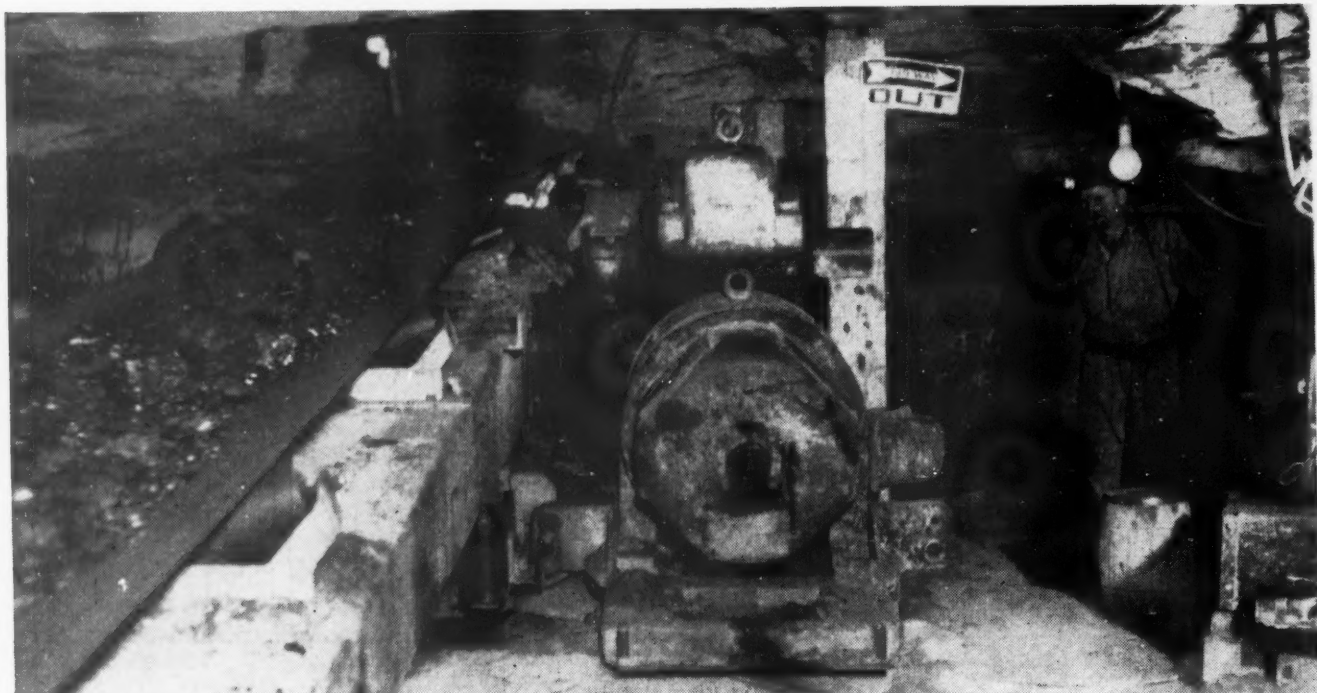


FIG. 5—DRILLING PATTERN in the America seam.

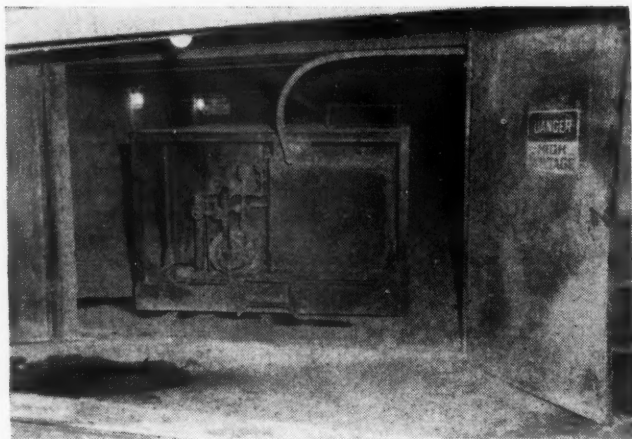
Modern Auxiliaries Facilitate Efficient Production



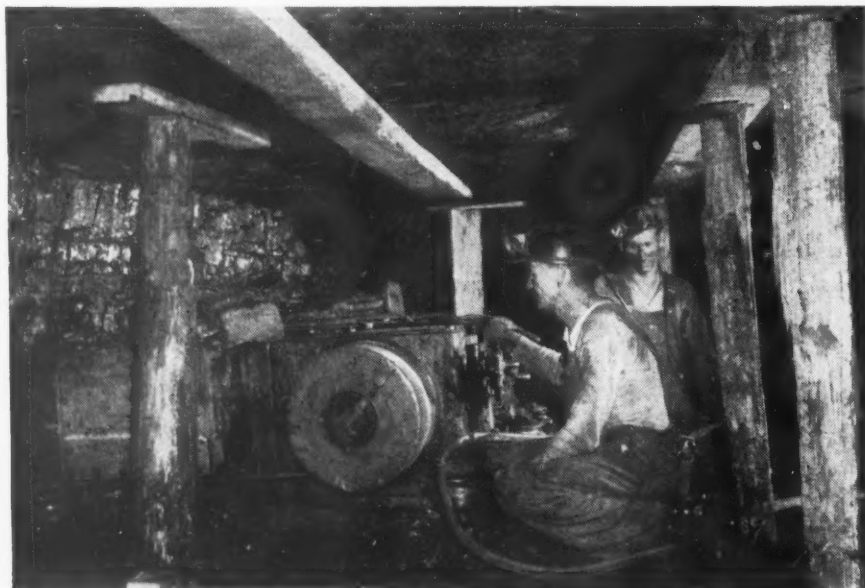
MOTHER-BELT INSTALLATION in the American seam at Gorgas.



MAIN-LINE HAULAGE at Gorgas features 60-lb. rail, treated ties and lighting with vaporproof fixtures supplied through conduit.



A 300-KW. PORTABLE RECTIFIER is the main power source for the America workings.

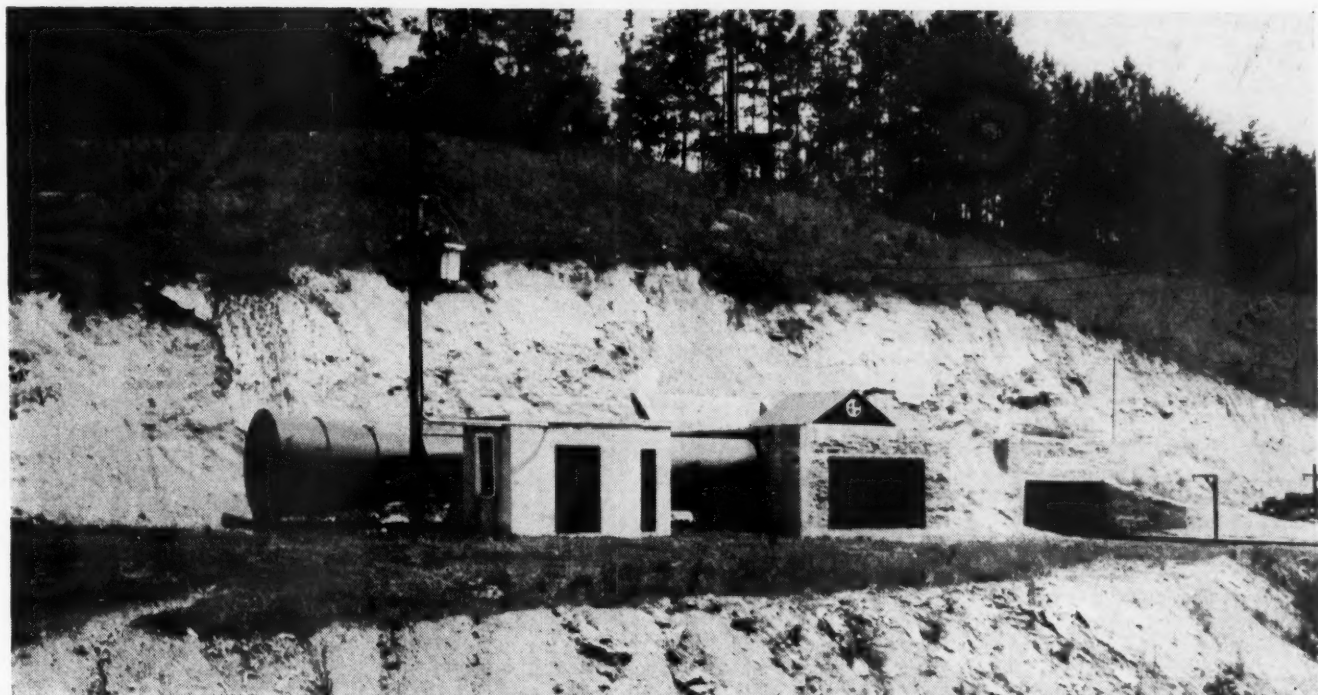


CUTTING UNDER CROSSBARS in an America-seam working place.

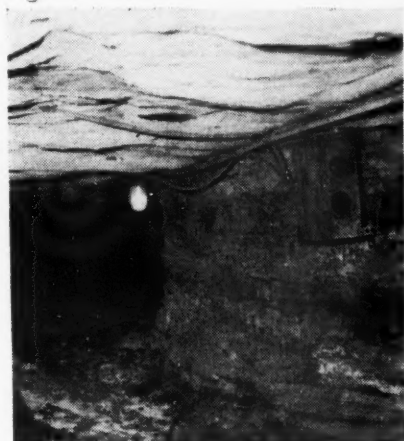
to cars, in which case a chain-type gathering conveyor is employed, a car trimmer is added to the crew. Usual production with such a crew is 4 to 6 cuts of about 35 tons each per shift.

The drilling pattern for a 20-ft. room is shown in Fig. 5. Eight holes are required, four in the top and four immediately over a hard streak about 18 in. up from the bottom. Usual loading is four sticks of 1 $\frac{1}{4}$ x6 Collier C permissible in the rib holes and three each in the center holes. Shots are fired with du Pont No. 6 electric detonators.

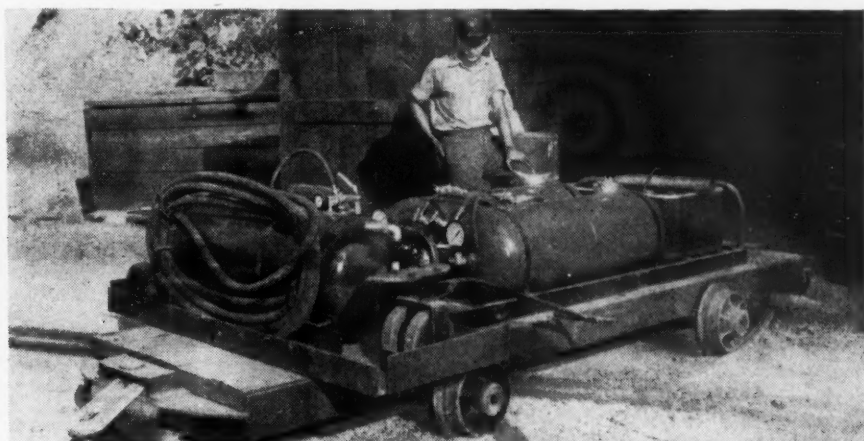
The mining plan in the America seam is based on working rooms both ways from a three-heading entry on the advance, as shown in Fig. 3. The belt is placed in the center heading 12 ft. wide. Air-courses on either side are driven



VENTILATION for both seams is supplied by this fan at Pratt-seam level. The bank was gunited some four years ago to prevent sloughing.



HAULAGE auxiliaries at Gorgas include electric switchthrowers and block signals.



SAFETY FACILITIES at Gorgas include this chemical-type fire engine for underground use, with small auxiliary for off-track use.

20 ft. wide with pillars 30 ft. thick between them and the center opening. Crosscuts are made opposite each room-neck to permit room conveyors to feed directly to the belts.

Present practice is to advance the belt heading and one aircourse with a Joy and chain conveyor feeding back to the belt, and then drive the aircourse on the opposite side with a duckbill. In addition to speeding up the rate of advance, this system reduces the distance the loader and cutter must be trammed or dragged, aside from the difficulty otherwise encountered in tramping or dragging around the chain in the belt heading. As soon as a belt entry is advanced sufficiently, room units are put to work on each side, making a total of three units working during the development stage. Then, when the

entry is completed, the entry unit may go into rooms at the top or elsewhere, or a duckbill set-up may be started.

Where, as occasionally is the case, all the drawslate comes down in the aircourse and heading crosscuts, the standard mining plan is modified to reduce the cleaning up that otherwise would be necessary. As shown in Fig. 4, a pair of rooms is converted into a sub-entry with a gathering conveyor. From this sub-entry, regular two-room set-ups are worked back to the entry, as shown. Then another sub-entry is driven two room lengths ahead, and from this sub-entry rooms are worked back toward the first ones and also ahead if another sub-entry set-up is to be made. In this way, cleaning up across the aircourse is necessary only at wide intervals

rather than at every room with the regular plan.

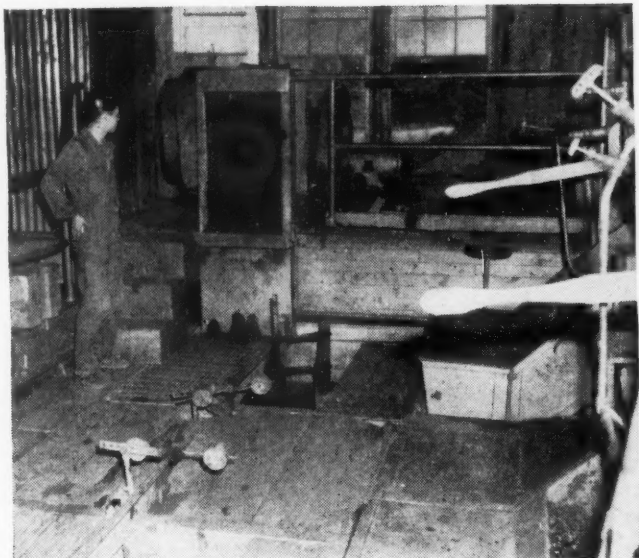
Car equipment in both the Pratt and America seams at Gorgas mines is primarily Sanford-Day drop-bottom, supplemented by a few Southern Car & Mfg. Co. units, all with Fafnir-bearing S-D "Floater" wheels. Sideboards were added to the original equipment (about 4¼ tons) to build capacity up to 6 tons.

Track gage is 48 in. Track consists of 70-, 60- and 56-lb. rail on 5x7-in.x6-ft. Osmose-treated ties. Installation of Osmose ties started in 1942 and there have been no losses since then. All the outside haul has been Thermit-welded, and it will be extended to the inside as time permits. All haulageways are lighted their full length. Crouse-Hinds vaporproof fixtures and con-

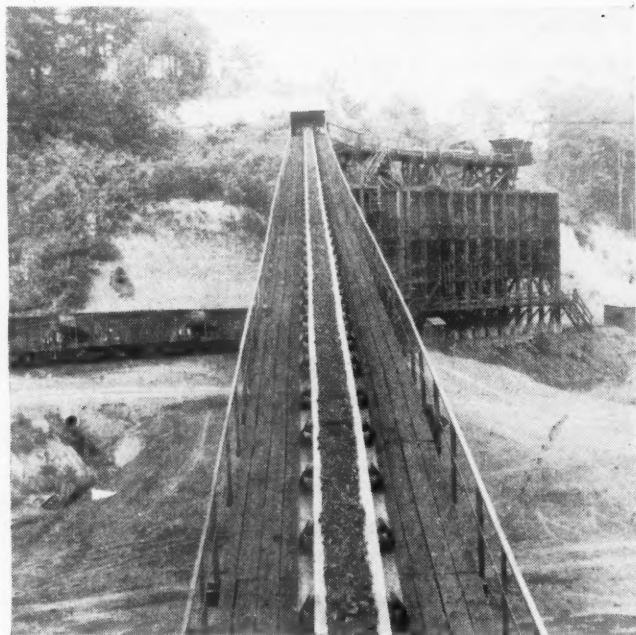
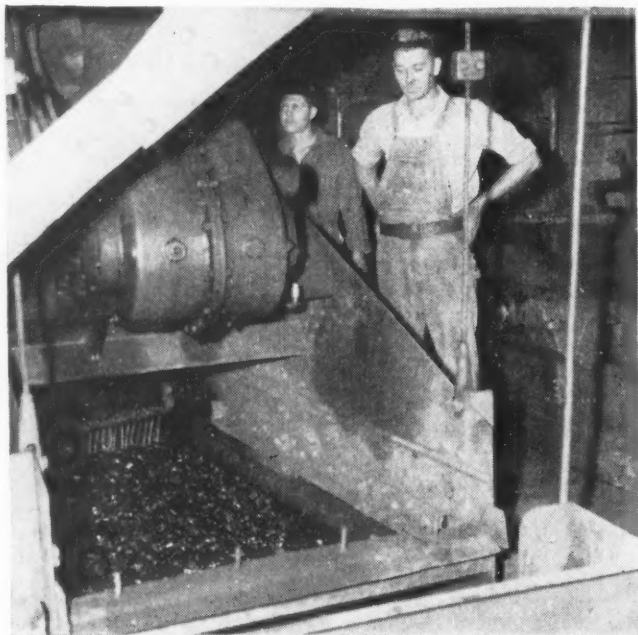
Mechanical Preparation Provides Better Fuel



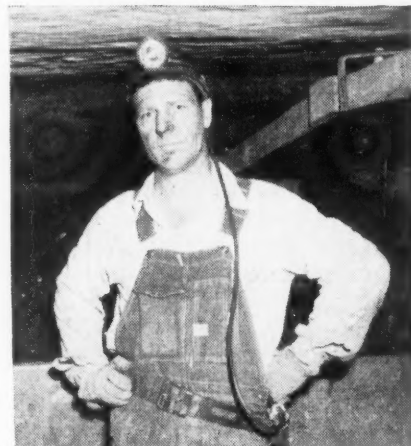
FIRST STEP IN PREPARATION is rough separation of refuse in the rotary breaker at the left, which precedes the washing plant.



TWO DIAPHRAGM jigs handle final cleaning at Gorgas. They are fed by gravity from a raw-coal storage bin following the breaker.



DEWATERING on vibrating screens precedes conveying of the washed coal to the storage bins (right).



GORGAS OFFICIALS—George H. Nason, superintendent (left), now in business for himself; C. W. Owen, assistant superintendent, night shift; Paul Glaze, assistant superintendent and chief electrician; Harry M. Johnstone, mine manager; and (right) Buel Birchfield, night mine foreman, Pratt No. 4.

duit are employed for a distance inside from the portal in the America seam and will be extended as additional fixtures and conduit can be obtained. Canton block signals and switch-position indicators are installed, with electric switchthrowers at strategic spots. The block signals supplement dispatcher control of trips.

Two-Mile Haul in America Seam

Length of the haul from the Pratt-seam workings to the outside is now 3,500 ft. The distance from the dump hopper at the preparation plant to the farthest belt in the America seam is now two miles. Two 6-ton Goodman locomotives take care of haulage from the Pratt openings, while America is served by the following: two 6-ton Goodman, one 8-ton Goodman, one 8-ton Westinghouse, one 10-ton Goodman and one 15-ton General Electric, the latter two normally pulling to the outside, while the others are gathering and relay units. Usual main-line trip size is 20 cars. Maximum grade against the loads is 0.75 percent.

Both the Pratt and America operations are ventilated by one 5-ft. Jeffrey Aerodyne fan on the surface at the level of the Pratt openings. Operating exhausting, the fan is driven by a 40-hp. Allis-Chalmers motor and in 1947 moved an average of 63,540 c.f.m. at a water gage of 2½ in. Air from the America seam below comes up to the fan through a shaft. The connection to the Pratt workings is through a steel drift. Two splits are provided in both the Pratt and America workings. All main-entry stoppings are fireproof.

Pumping in the Pratt workings is handled by two 4x5 Gould units with 5-hp. Westinghouse motors and one 2x2 centrifugal with 10-hp. motor, all discharging through pipelines to the outside. In the America workings, however, the water problem was complicated by the necessity for developing alongside old and abandoned workings which had filled with water. It was necessary to drill through the barrier into these workings and drain them off, involving, among other steps, the drilling of two boreholes to the surface.

One of these two holes now is the main mine discharge. It is supplemented by a sump and a 4x4 centrifugal driven by a 30-hp. Westinghouse motor. Depth of the 6-in. cased hole is 125 ft. Water from all the active America workings is

pumped to the sump through a 4-in. gathering line, in turn fed through 2-in. lines by pumps in every entry, plus other units along the haulway to take care of seepage. Gathering-pump equipment in the America workings includes the following: one 4x5 Gould, 1-hp. Crocker-Wheeler motor; one 6x6 Deming, 10-hp. Westinghouse; five 6x6 Demings, 7½-hp. Westinghouse; two 4x4½ Deming, 2-hp. Reliance; three 4x4½ Deming, 1½-hp. Westinghouse; one 5x5 Deming, 5-hp. Westinghouse.

A second borehole also used for main dewatering now takes care of seepage in the worked-out territory. Depth of the hole is 117 ft., 6-in. cased, and the pump is a 6x6 Deming with 10-hp. Westinghouse motor. In addition, a borehole and pump are employed for keeping the area around the Pratt-coal reloading station along the America main entry dry, and another pump and ditch discharge a part of the America water through the No. 2, or supply, drift.

Substation Equipment Varied

D.c. power for the operation of equipment in both seams is supplied by one 200-kw. Westinghouse m.g. set and two 250-kw. Westinghouse rotaries, both on the surface at the Pratt-seam openings, and a 300-kw. Westinghouse portable rectifier, dry-type transformers, underground near the center of the America working load. A.c. at 2,300 volts is taken overland to a borehole to feed the rectifier.

The main outside station serves the Pratt workings and main haulage in the America through a 6/0 trolley paralleled by a million-circular-mil feeder. From the rectifier to the active America workings, distribution is through the 6/0 trolley and parallel 1,000,000 feeder to the belt entries. In the belt entries, one 4/0 positive is installed to serve the cutting machines and one 2/0 positive for the loaders and room conveyors. Normally, two cutters, two loaders and four room conveyors are worked per entry. The return in belt entries, common for all machines, is a 4/0 conductor. The main return outside the belt entries consists of the two 60-lb. track rails, both bonded with two 4/0 bonds per point. In time, as previously pointed out, all main-line track will be welded. Later, a 250-kw. Westinghouse set will be moved forward on the surface to serve a part of the advanced America workings. It will be completely

separate from the remainder of the system.

Westinghouse 1,600-amp-automatic-reclosing sectionalizing switches are now being installed on all stub-end feeders.

Portal facilities are concentrated at the Pratt-seam openings and consist of a supply house, fireproof oil house, electric shop, bathhouse, lamphouse and office, sand-house with self-feeding borehole down to the America seam, powder house, detonator house, rock-dust storage and fire-engine shed and a wheel-grinding house for mine-car wheels (see p. 124 of this issue.) Shop equipment includes a 400-amp. Hobart arc welder, lathe, drill press, grinding wheels, shaper, air compressor, forge, bit sharpener, bolt-threading machine and wheel press.

Parts Kept Underground

Overhauling of equipment at Gorgas mines is done only as necessary. In general, the machines are kept in good operating condition by replacing motors and parts as necessary. Major tearing down or repairing underground is not permitted. In line with that policy, the following are kept underground for replacement as necessary: two spare 12 BU head motors, two cat motors complete with reducers, two gathering-head right-angle speed reducers with gathering arms, spare motor for shaker conveyors and the necessary spare motors and reducers for chain units. A Joy transporter is on hand for moving loaders and other equipment over the main line when necessary. In addition, a stock of hoses, hydraulic jacks and other parts that may be needed during the shift are kept in a centrally located supply depot underground.

Forms used in checking on production, man-shifts worked and delays at the Gorgas mines are shown in Fig. 6. Mechanics are regularly assigned to each working section and their duties include passing information on jobs needing to be done to the men on the following shift.

Lubrication is handled by special men at Gorgas—two on the first shift and one each on the second and third shifts. These men make the entire workings and grease everything. One man also is assigned to each belt on each operating shift to watch its operation and clean up spillage, particularly around room-conveyor heads.

Supplies are delivered to room entries by reversing the belts to

The image shows four overlapping forms used for reporting at Gorgas mines. The forms are:

- MINE FOREMAN'S DAILY REPORT**: Includes sections for 'MEN IN CREW' (listing occupations like Mine Foreman, Track Foreman, etc.) and 'DELAYS' (listing causes like Jolt broke down, Duckbill broke down, etc.).
- MECHANICAL LOADING (DUCKBILL) FOREMAN'S DAILY PRODUCTION REPORT**: Includes sections for 'MEN IN CREW' and 'DELAYS' (listing causes like Duckbill broke down, Cutting machine broke down, etc.).
- HAULAGE FOREMAN'S DAILY REPORT**: Includes sections for 'MEN IN CREW' and 'DELAYS' (listing causes like Waiting on washer, Wrecks, etc.).
- TIPPLE FOREMAN'S DAILY REPORT**: Includes sections for 'MEN IN CREW' and 'DELAYS' (listing causes like Power off, Washer broke down, etc.).

FIG. 6—DELAY, LABOR AND PRODUCTION forms used at Gorgas mines. A fifth form, not shown, is used for loading machines and, except using "Loader" instead of "Duckbill," is the same.

carry them back to the room necks. From there they are taken to the working faces by hand. At one time chain conveyors were reversed to take supplies into rooms, but chain breakage, maintenance and delays were excessive. A Gorgas rule is to keep enough of everything in a place to work it out, which eliminates transferring material from section to section with attendant delays and extra cost.

Washing to reduce ash content and assure uniformity of the final product to the Gorgas steam plant is the final step in production at Gorgas mines. After weighing, the raw product is dumped into a 150-ton bin on the hillside above the preparation plant. From the bin a plate feeder moves the coal onto a 48-in. wide conveyor leading to a

10½x19-ft. Bradford breaker. Plus 3-in. material discharged by the breaker goes to a slate bin, while the minus 3-in. product through the screen is discharged to a 30-in. belt conveyor to a bin preceding the washing units.

Two single-compartment Jeffrey diaphragm jigs fed from the bin by gravity handle the cleaning at Gorgas. Including drawslate and bottom rock, these jigs and the breaker rejected 30.5 percent of the raw feed in 1947. Better cleaning underground, however, has reduced the reject percentage to 24 in 1948. Jig refuse is discharged to the slate bin over a 24-in. belt, while the washed coal is dewatered on two 4x12-ft. Allis-Chalmers and Tyler vibrating screens.

Fines and slurry from the vi-

brators are flumed to a wood settling tank, from which they are discharged to a 24-in. belt which conveys the entire washed product to a 1,000-ton washed-coal bin equipped with a 24-in. distributing belt. From this bin, the coal is hauled by rail to the Gorgas steam plant. Conveyor weighers will be installed on both the raw- and washed-coal sides of the plant for a more accurate check of results. A complete chemical laboratory with facilities for regular sampling and analysis supplements the main plant.

The refuse bin at the washer is equipped with a Thrustor-equipped clamshell-type gate arranged for pushbutton loading of the refuse larry. When the empty larry is in position at the bottom of the incline, the hoistman pushes a button to open the gate and load. Then he starts the hoist to pull the larry to the dump on top of the refuse pile. As the larry starts up the incline, the drag with which it is equipped drops automatically.

Operation of the Gorgas coal mines heads up in James M. Barry, vice president and general manager, and Milton H. Fies, manager of coal operations, both at headquarters in Birmingham. At Gorgas, Harry M. Johnstone is mine manager, with other officials as follows: Paul Glaze, assistant superintendent and chief electrician; C. W. Owen, assistant superintendent night shift; general mine foreman—America, John W. Davies; Pratt, Henry Aikins; second shift—America, Thomas W. Wood; Pratt, Buel Burchfield; third shift—America, Rufus Wilson; washer foreman, Clyde Brasfield; mining engineer, W. O. Hodgkin; safety director, C. A. McGaha; assistant, Lawrence Henderson. George H. Nason was mine superintendent until the middle of May, when he left to go into mining for himself.

Average daily washed-coal production in 1947 was 1,844 tons. It has been increasing and at the time this article was prepared was running over 2,000 tons. Employees totalled 557 on Dec. 31, 1947, of which 448 were underground. Production per man-shift in 1947, including everybody from the mine manager on down, was 6.196 tons raw and 4.262 tons washed. These tons per man-day include all salaried and other employees engaged in work during all periods of idleness, including no-work Saturdays and Sundays and all strike periods. Strikes in 1947 totaled approximately four weeks.



NEW-TYPE RUBBER-TIRED LOCOMOTIVE operated by John Tizen brings out a trip of rubber-tired cars.

Truck Mines Haul on Rubber

Small Low-Cost Battery-Powered Shuttle Cars and Rubber-Tired Locomotives Serve Virginia and West Virginia Truck Mines—Locomotives Supplemented by Three-Wheeled Rubber-Tired Mine Cars With Lift Endgates

EXTENDING the field of rubber-tired haulage, a growing number of truck-mine operators in Virginia and West Virginia are pioneering in the use of low-cost battery-powered

rubber-tired locomotives and shuttle cars, as well as rubber-tired mine cars. At least four or five small operators in Buchanan County, Virginia, and one near Gilbert,

W. Va., are now using such equipment. The movement apparently started with the development of rubber-tired three-wheeled mine cars of the lift-endgate type to be moved by hand or pulled by ponies. One operator, who encountered grades too stiff for handling the rubber-tired cars with ponies, purchased a few war-surplus battery-powered industrial trucks for rebuilding for mine duty, and that touched off the development of low-cost "locomotives" and shuttle cars



TRIPS ARE STOPPED in the yard for uncoupling and dumping at the Tizen Bros. Mine.



THE THREE-WHEELED RUBBER-TIRED CARS are uncoupled and pushed onto the dump at Tizen.

Varied Designs Feature Small Rubber-Tired Haulage Units



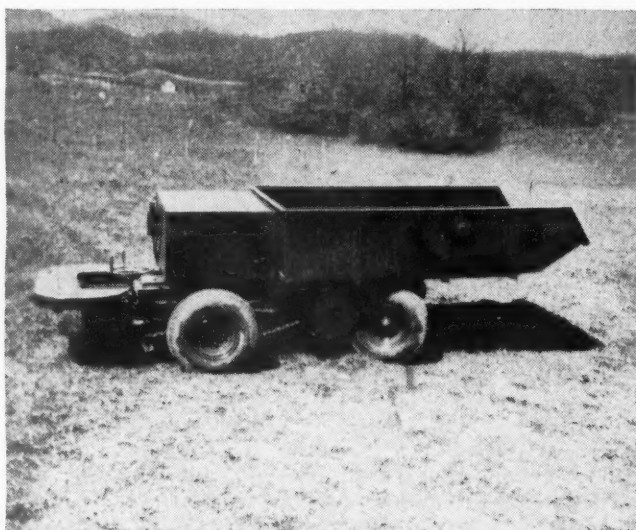
A. C. PETTIT, partner in the J. P. & R. organization, operating the 2-ton battery-powered shuttle car.



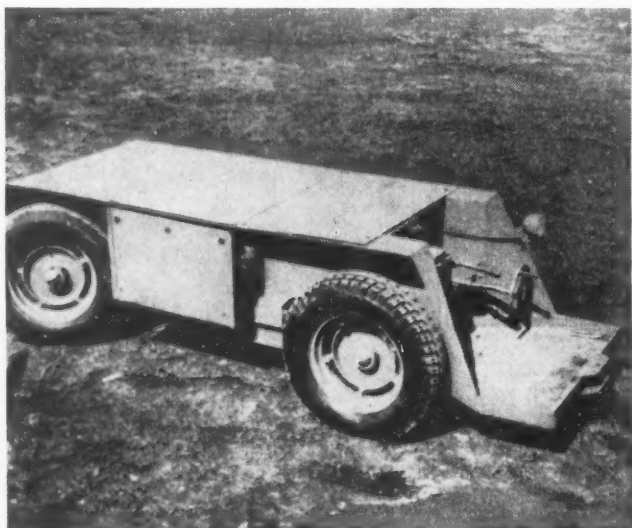
SHUTTLE CAR in position to dump. Pulling a lever permits the body to tip and discharge the coal.



SHUTTLE CAR DUMPING. The body returns to normal and latches automatically as the car starts away from the dump.



EARLY SHUTTLE CAR with a capacity of 1 1/4 tons was built from an industrial truck for mine service.



EARLY 2,495-LB. LOCOMOTIVE is 32 in. high with rear-wheel drive and front-wheel steer, 3.5 to 5 m.p.h.



FRANK AND JOHN KERSEY pose with their latest four-speed four-wheel drive, steer and brake locomotive.

designed specifically for small mine duty.

Four rubber-tired mine cars and a rubber-tired locomotive are in use at a mine of Tizen Bros. Coal Co., in Buchanan County, three miles from Marvin and 18 miles from Richlands. The locomotive was made by Commercial Machine Service, owned by John and Fred Kersey, Double Gate Community, Bluefield, W. Va. The three operational illustrations of mine cars and locomotives included in this article were made at the Tizen mine through the courtesy of John and Virgil Tizen, partners.

Four-Wheel Drive and Steer

The locomotive, weighing 3,300 lb., is a four-wheel-drive four-wheel-steer unit equipped with four-wheel hydraulic brakes. It is driven by two 36-volt motors powered from a Prestolite lead-acid battery rated at 496-amp.-hr. at a six-hour rate. Height over the cover plates is 28 in., but the highest points are the tires, which are 6:00x16 in. lug grip. The axles have inclosed differentials and the motors are connected to the pinion shafts by roller chains.

Charging is done with purchased power through a 35-amp. 110-volt (input) "Automatic Selenium Rectifier," manufactured by Fansteel Metallurgical Corp. for the Automatic Transportation Co. As the men leave the mine at the end of the day they put the locomotive on charge and set the meter to disconnect after a predetermined amount.

The Tizen Bros. mine is in 45-in. coal lying fairly level. The lease of 20 acres comprises a strip 750 ft. wide along the outcrop. After rooms have been mined from the present double-heading entry, a new entry will be driven and a new dump hopper and truck-loading chute erected. This process will be repeated until the lease has been mined out. Maximum underground haul will not be much over 750 ft. The coal is shot off the solid and is hand loaded. Average production is 50 tons per day, one shift.

Four 1-ton mine cars equipped with 4:00x8-in. tires are now in use and the locomotive pulls all four when fully loaded with coal. John Tizen says it could pull a fifth car if it were available. When the mine was being opened the rubber-tired cars were pushed by hand. Then ponies were installed, but they could not negotiate satisfactorily the slightly adverse grade encountered.

The car dump is 50 ft. from the portal and the truck-loading gate is at the bottom of the combination chute and dump hopper. As the illustrations indicate, the trips are pulled out in the yard and stopped on a curve, with the last car about 15 ft. from the portal. Each car is then uncoupled and pushed by hand onto the dump, which is equipped with an endgate-lifting hook. In pushing the cars, the men guide them with the short tongue attached to the swivel fork of the front wheel. The Tizens expect to replace the present three-wheeled rubber-tired lift-endgate mine cars with new units of the same type but carrying 2 tons. These larger cars will have dual wheels at the rear.

A mine of the Matney Coal Co., about ¼ mile from the Tizen property, uses two of the three-wheeled rubber-tired lift-endgate mine cars but has no locomotive.

An earlier type of locomotive built from an industrial truck by the Commercial Machine Service, and in regular use at another mine, is shown in one of the non-operational illustrations. It is 32 in. high and weighs 2,495 lb. It is a rear-wheel-drive front-wheel-steer unit with an Edison 36-cell Type A-4 battery.

Latest Locomotive 24 In. High

A new locomotive, delivered by Commercial Machine Service to the Van Sant Coal Co., Vansant, Va., near Grundy, July 13, is shown in another non-operational illustration. The Van Sant company is operating in a seam 32 to 40 in. thick. With a gross weight of 3,100 lb., the new locomotive has a drawbar pull of approximately 2,000 lb. Over-all height is 24 in.; width, 55 in.; length, 10 ft. 5½ in. The model number, 444, indicates four-wheel drive, steer and brakes, as well as four speeds of operations. Like others produced by the same organization, it has a tilting front axle.

The shuttle car shown in the accompanying operational illustrations is in use at Mine No. 4 of the J. P. & R. Coal Co., where the illustrations were made through the courtesy of Harry J. Johnson, one of the partners with A. C. Pettit and Clarence Ramey. This mine, producing 90 tons of hand-loaded coal per day of one shift, is on Stiltner Creek. The access road turns off U. S. Highway 460 at a point 3½ miles from Grundy, Va., in the direction of Pikeville, Ky.

This end-dumping self-propelled

shuttle car, also made by Commercial Machine Service, carries 2 tons of coal. Height is 43 in. and the unit includes rear-wheel-drive, front-wheel-steer and an Edison 36-cell Type A-4 battery. Charging is done by a Koehler 4-cylinder gasoline engine directly connected to a d.c. generator.

This mine is in the Clintwood seam some 7 to 10 ft. thick. Haulage to the portal is now 450 ft., but the maximum haul eventually will reach 2,000 ft. It is not planned to haul that distance with the shuttle cars but instead to install a locomotive and rail cars and limit the shuttle cars to the working sections.

Two Shuttle Cars in Use

Three, and sometimes four, men load into the shuttle car while it stands at the face. In addition to the one shuttle car shown in the operational illustrations, a smaller 1¼-ton unit—the first installed at the mine—also is in regular service. It was built from an industrial truck and uses the same type and size of battery. This older shuttle car is shown in one of the three non-operational illustrations. Its speed of 6 m.p.h. proved somewhat faster than advisable from the standpoint of conserving battery capacity. Consequently, the 2-ton car was geared to 3½ m.p.h.

The J. P. & R. organization operates four truck mines, all on Stiltner Creek. At No. 1 mine, in thinner coal (Splashdam seam), the company employs a rubber-tired battery locomotive and six 1-ton three-wheeled rubber-tired mine cars.

Grades too severe and/or coal too thin for pony haulage appear to be the principal reason, or reasons, for this trend toward rubber-tired equipment in small truck mines. Present difficulties in finding light-weight steel rails, plus the price increases placed on them, are further reasons for the small mines switching to rubber.

Mr. Johnson, who was among the first to install this light-weight rubber-shod equipment, says his experience indicates it pays even if rails are already in the mine and are taken out. Since they are subject to the same influences as other equipment, exact information on the prices of the rubber-tired self-propelling units described in this article cannot be given. However it is known that some of the locomotives have cost the purchasers somewhere between \$2,500 and \$3,500.



FOUR-MAN FACE CREW cutting, loading and drilling in cycle in the 50-ft.-wide room in the new No. 2 Gas mine.



DUMMY PAN LINE loaded with supplies. As the room advances, the trough is overturned and used in the working pan line.

High Extraction With Duckbills

Coal Recovery Totals 85 Percent With Duckbills in Rooms 50 Ft. Wide on 55-Ft. Centers — Shakers Served by Mother Belts—Supplies Handled by Rubber-Tired Trucks and Dummy Pan Lines—Dust Control Emphasized

By J. WILLIAM PERFATER

Vice President, Wyatt Coal Co., Charleston, W. Va.

THE WYATT COAL CO., Charleston, W. Va., opened a new mine in the No. 2 Gas seam, at Eskdale, on Cabin Creek, Kanawha County, W. Va., in July, 1946. Since that date, four Goodman Type G-20 shaker conveyors equipped with

Type E-1½G21 duckbills and Size 1½ troughs have driven approximately 40,000 ft. of entry. In October, 1946, four additional shaker conveyors and duckbills of the same type were installed for room work. Since then, rooms 270 ft. to 300 ft.

deep and 50 ft. wide have been recovered at a rate of 12 rooms per month by the four shaker conveyors equipped with duckbills.

The No. 2 Gas seam outcrops at the foot of the 700-ft. surrounding hills at the town of Eskdale. The seam has a general 3-percent dip to the north, with grade variations up to 7 percent in 100 ft. in any direction. The seam thickness varies from 37 to 44 in.—all clean coal. The top is an extremely hard slate with occasional sandstone lenses up to 6 in. in thickness at the top of the coal. The bottom is medium slate 24 in. thick underlain by a 4-in. coal band. This bottom slate has a tendency to heave in entries. It and the 4-in. underlying coal seam are taken in the tracked haul-

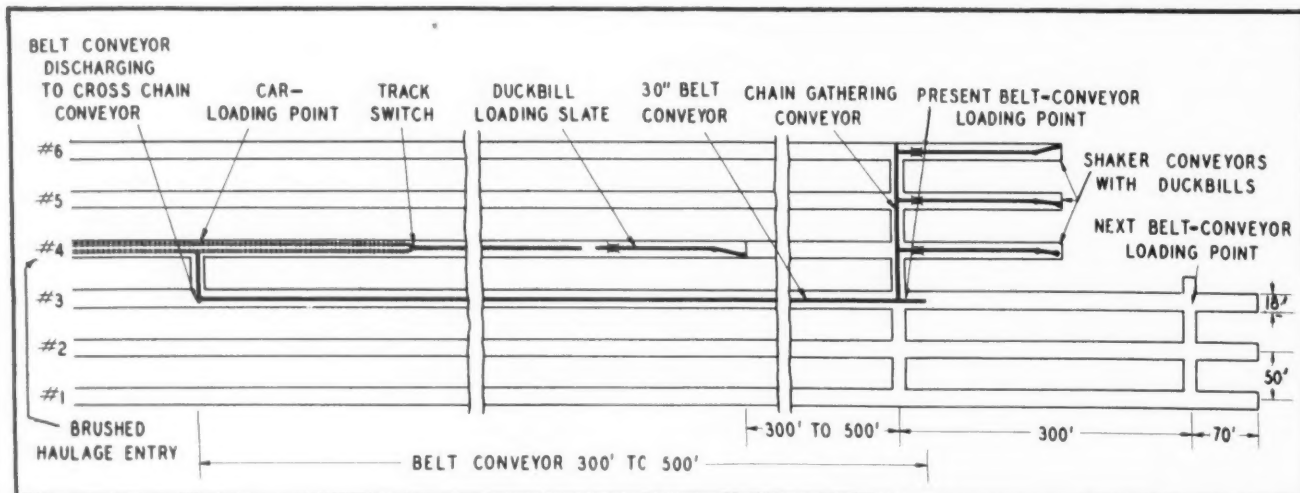


FIG. 1—MAIN-ENTRY DEVELOPMENT PLAN.



DUCKBILL equipped with 8-ft. extension trough between the 30-deg. swivel and duckbill underpan to load out 50-ft. rooms and crosscuts.

age heading in the main and cross entries.

There are approximately 1,000 acres of No. 2 Gas seam in this property, providing a contemplated mine life of 25 years. The mine projection takes full advantage of grade in the flow of the coal. The main six-heading entry is driven directly up the dip. Eight-heading cross entries are turned at 60 deg. off the mains on 4,000-ft. centers. The four-heading face entries are turned 62 deg. each way off the cross entries on 600-ft. centers for 2,000 ft. Rooms are turned at 67 deg. to the entry 50 ft. wide on 55-ft. centers. All entries are 18 ft. wide on 50-ft. centers with crosscuts on 90-ft. centers. Rooms are worked from the tops of the panel entries toward the cross entries. A total extraction of 85 percent is being obtained.

Entry Development

The main six-heading entry is being driven in coal with three Type G-20 shaker conveyors with duckbills. Another unit of the same type placed 300 to 500 ft. back of the coal heading takes bottom slate for the tracked haulage entry (Fig. 1).

The three duckbills in coal advance three parallel headings 600 ft., or 300 ft. for each move-up. They then move to the three adjacent headings and drive up 600 ft. Crosscuts are lined up at 300 ft. intervals. A chain conveyor is laid through them to gather from the three shaker conveyors. No bottom is taken by these duckbills. The chain conveyor discharges onto a 2,000-ft. 30-in. Type 97-HC gather-

ing belt conveyor located in the No. 3 heading. A chain conveyor transfers the coal from the belt conveyor to 4-ton cars in the parallel No. 4 haulage heading.

Bottom slate is taken the full 18-ft. width in the No. 4 haulage heading to provide a 6-ft. height for car haulage. This is accomplished by a three-man crew working between the coal headings and the inby switch of the car-loading point. They are equipped with a G-20 shaker conveyor with duckbill, locomotive and side-dump rock cars, which the crew switch and dump. This is a two-shift operation, advancing 15 ft. per shift and thus keeping pace with the single-shifted entry-driving crew ahead of them.

Each duckbill face crew in coal consists of three men. These men cut, load, drill, shoot, timber and lengthen their shaker conveyor on a definite cycle. Thus, by coordinating their work and overlapping the necessary operations to recover the coal, the work is divided equally and smooth production is obtained.

The standard face-work cycle in duckbill headings (Fig. 2) is as follows:

Phase I—After cutting the place, the shortwall is left under the left rib. Holes 1 and 2 are drilled and loaded.

Phase II—Holes 1 and 2 are shot. The duckbill loads from the center of the room to the right rib and cleans up so that the shortwall can move across to the right rib and sump. The duckbill then finishes cleaning up on the right side.

Phase III—Hole 3 is shot and loaded out while the machine is cutting to the center. Holes 1 and 2

are drilled. When the machine reaches the center of the place, the duckbill and dummy pan line are pulled up by the shortwall. The shortwall then cuts to the left rib while the two men finish extending the conveyor. The machineman then rock-dusts and sprinkles while the duckbill man and machine helper timber. The cycle is then repeated.

Considering the total elapsed time per cycle to recover one fall as 100 percent, times for the various operations are: duckbill loading out and cleaning the place, 52 percent; Type 112 shortwall cutting and moving, 33 percent; drilling, 16 percent; timbering, 14 percent; lengthening conveyor, 19 percent; and loading holes and airing, 16 percent of the elapsed time. Thus, 150 percent of elapsed time would have been required if each operation had been performed separately. A 33 1/3-percent saving was accomplished by coordinated cycle operation.

Room Work

A 30-in. Type 97-HC belt conveyor is located in the No. 2 heading of the four-heading panel entry. No bottom or top is taken in the panel entries as the belt conveyor is low enough to permit men and materials to ride the belt safely under any necessary timbering. The belt conveyor is shortened in 150-ft. stages as the panels are retreated. The room sections consist of four working places. Two rooms each are opened 20 ft. wide off No. 1 and No. 4 headings and then are widened to 50 ft. Since the belt conveyor is in one of the inside headings, this provides sufficient space for the first room cut to be loaded out by the duckbill. The four shaker conveyors discharge directly onto the belt conveyor.

The 50-ft. wide rooms are driven 300 ft. deep off No. 1 entry and 270 ft. deep off No. 4 entry. Normally 18 to 20 shifts are required to recover a room with the Type G-20 shaker conveyor using No. 1 1/2 troughing and Size E-1 1/2 G21 duckbill. After the room is widened, an 8-ft. long trough is inserted between the 30-deg. swivel and the underpan of the duckbill. This permits the duckbill to load out the crosscuts.

The room face is worked on a definite face cycle in which all operations overlap without interference or delay between the men or the operation they are performing. This cycle consists of three phases (Fig. 3), as follows:

Duckbill Cycles for Entry and Room Work

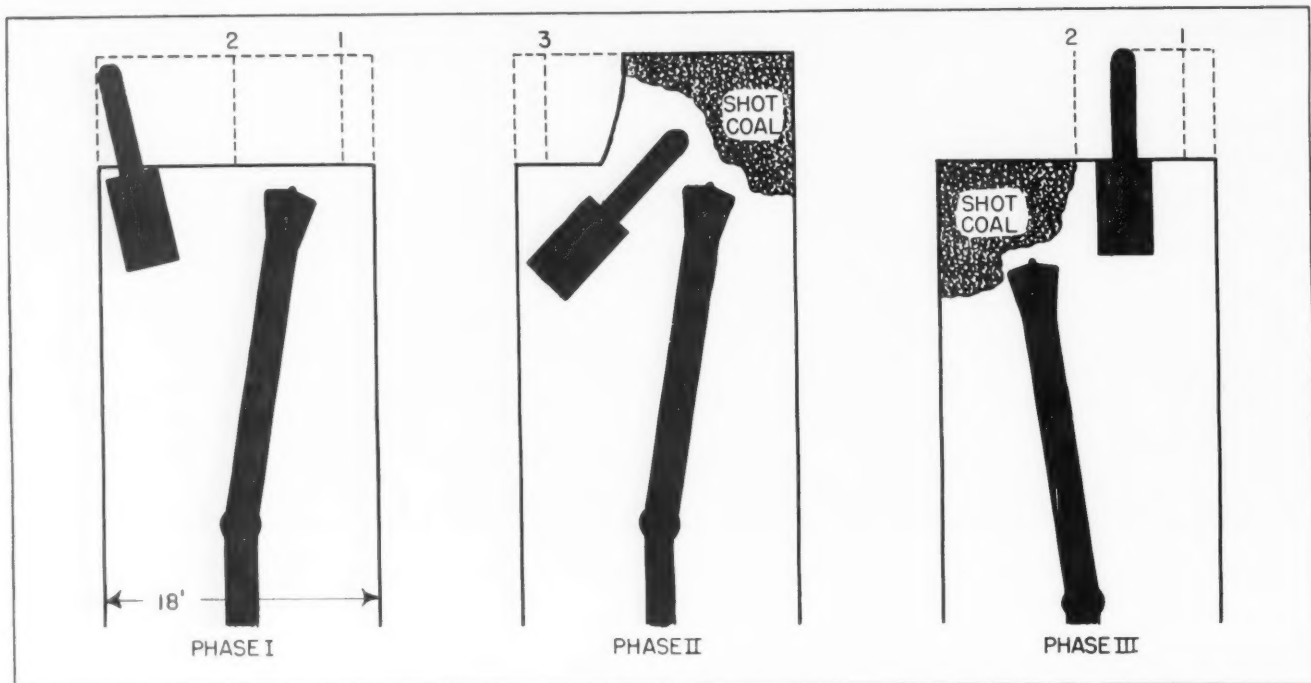


FIG. 2—FACE CYCLE IN ENTRY DRIVING.

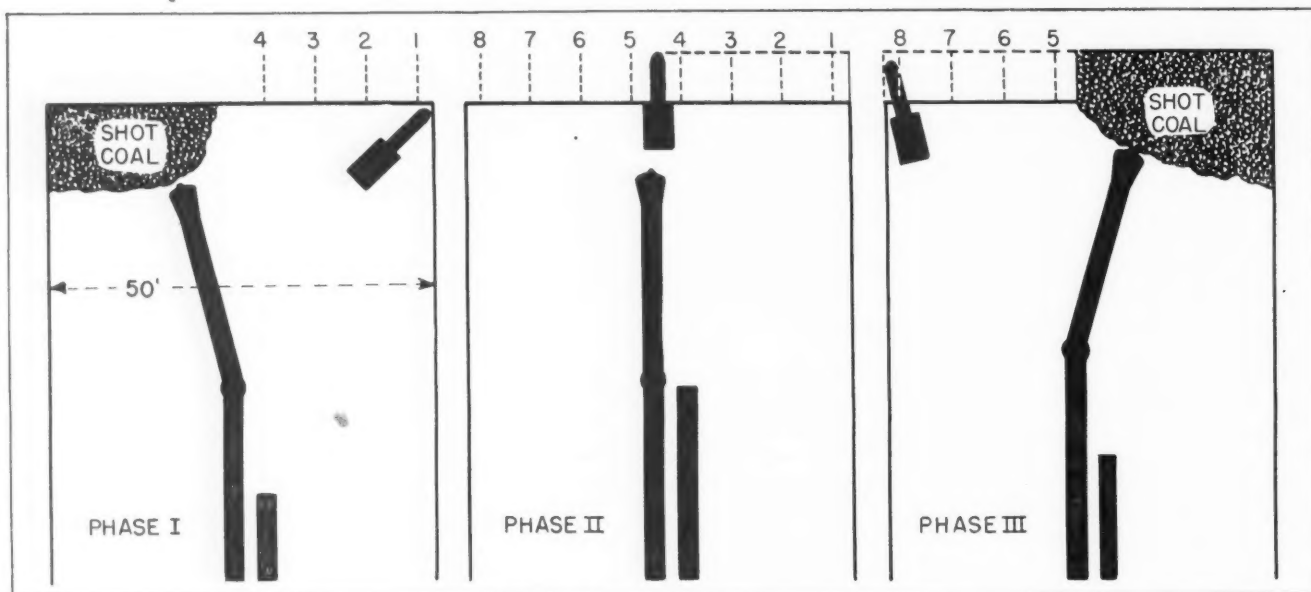


FIG. 3—FACE CYCLE IN ROOM WORK.

Phase I—The duckbill operator and helper load out the left side of the room while the machineman and helper drill the four right-side holes, sump, dust and cut to the center of the place. By this time the left-hand side of the room is cleaned up. Crew members who finish first timber, rock-dust or sprinkle the last cut.

Phase II—While the shortwall is at the center of the room it pulls the duckbill ahead so that a pan may be added, if required, and pulls the dummy pan line to a point opposite the swivel. Timber, rock dust and cap pieces are unloaded from the end trough of dummy line. This pan is then turned over into the

operating pan line and bolted up by the duckbill men. After pulling up the duckbill and dummy pan line, the two machinemen drill the four left-side holes and start cutting to the left rib. Shortly before the duckbill men have finished lengthening the conveyor, the cutting crew loads and wires the four right-hand holes. When panning-up is completed, the four right-hand holes are shot.

Phase III—After a short airing to clear the smoke, the duckbill men load out the right side of the room while the machinemen finish the cut to the left rib, set bits and pull back to the center of the room. Meanwhile, the duckbill has loaded

out most of the coal from the center to the right rib. It cleans up the right rib so that the machine can pass in front of the duckbill to sumping position on the right. The duckbill then cleans up the right side from the rib to the center while the machinemen are sprinkling, rock-dusting, drilling and timbering in preparation for a new cycle.

Study of face cycle shows that only 4 percent of the total crew time is spent in non-productive labor. From studies, also, it is estimated that as a result of overlapping, the face operations require only 55 percent of the time that would be necessary if the same op-

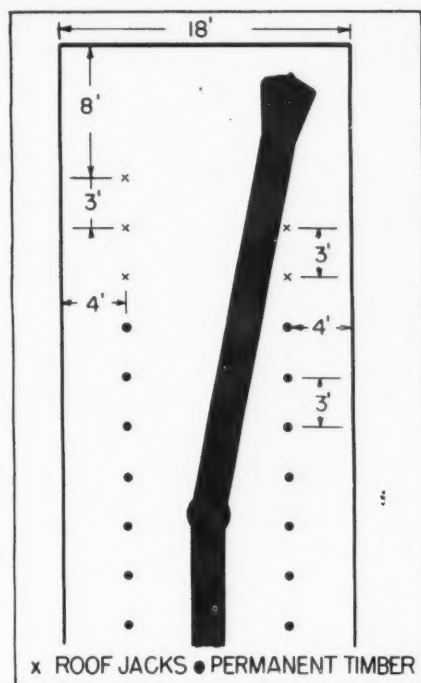


FIG. 4—TIMBERING IN ENTRY DRIVING.

erations were performed separately. Thus, the same size of crew per section can produce the same tonnage with approximately one-half the working rooms and necessary room equipment.

Timbering

Although a very hard and strong slate top is general throughout the mine, care is taken to provide ample roof support. Fig. 4 shows entry timbering. Five screw roof jacks are maintained at the face. Three are opposite the side on which the duckbill is operating. Jacks are maintained to the second cut back 4 ft. from the rib and spaced 3 ft. in line with three permanent timbers set along each rib ahead of the swivel.

Five screw roof jacks are used 8 ft. from the face, as shown in Fig. 5. Three temporary timbers are set opposite the duckbill. Permanent timber also is shown in Fig. 5.

Rock Dusting and Sprinkling

To reduce the dust hazard, the mine is thoroughly rock-dusted and all coal is wet down by sprays three times before being loaded into mine cars.

The second cut back of the face is hand-dusted after the fresh cut has been loaded out. When the room is completed and equipment removed, it is thoroughly rock-dusted with a rock-dusting machine. Return airways are rock-

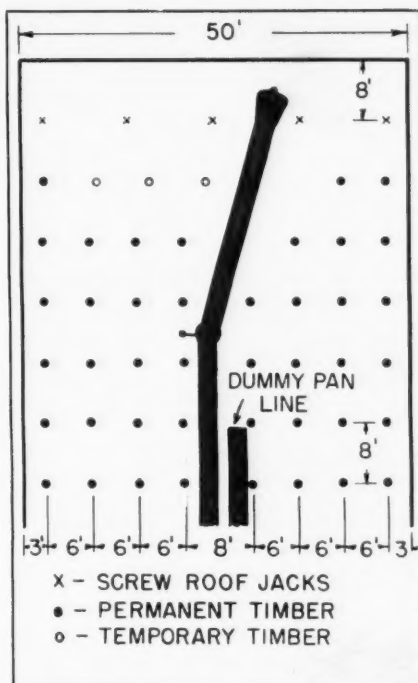


FIG. 5—TIMBERING IN WIDE ROOMS.

dusted twice a week by machine.

Water for sprinkling is obtained from a high enough elevation up the creek to provide a natural flow to three 2-in. centrifugal pumps near each working section. A flow of 50 g.p.m. is delivered to these booster pumps. Water is piped to each working face. After each face is loaded out, the place is hosed. An overhead spray is located near the face over each shaker conveyor. The coal is sprayed again as it is loaded onto the belt conveyor and again at the belt head where it is loaded into mine cars. The mine is non-gaseous, but additional precautions against gas and dust include maintaining two separate ground wires to the face.

Supply Handling

Timber, rock dust and other supplies are brought to the belt head in mine cars at the beginning of each shift. While the belt conveyor is reversed to take the men to their working places, these supplies are loaded onto the belt and unloaded at the room necks as required. The supply material is then loaded on small four-wheeled pneumatic-tired trucks and pulled to the outby end of the dummy trough line. There the face supplies are loaded on top of the troughing to be pulled to the face. In entries, the supplies are moved from the tail pulley of the belt conveyor on the small wheeled trucks through crosscuts to the respective rooms and placed on the dummy trough line.

In room work, the troughs from the previous set-up are stored in the outside heading adjacent to the new room. A dummy trough line paralleling and approximately 2 ft. from the working trough line is formed by inverting enough of the stored troughs to reach from the entry to a point opposite the swivel. These troughs are loosely bolted together to form a continuous line. Face supplies of timber, cap boards and rock dust are then loaded on top of this inverted trough line. As the face advances, the dummy trough line is pulled ahead by the shortwall at the face. The supplies required for the next cut are unloaded from the inby trough near the swivel. This trough is then unbolted and turned over into place behind the swivel to lengthen the working trough line. Time required to lengthen the trough line 13 ft. is 10 to 12 min.

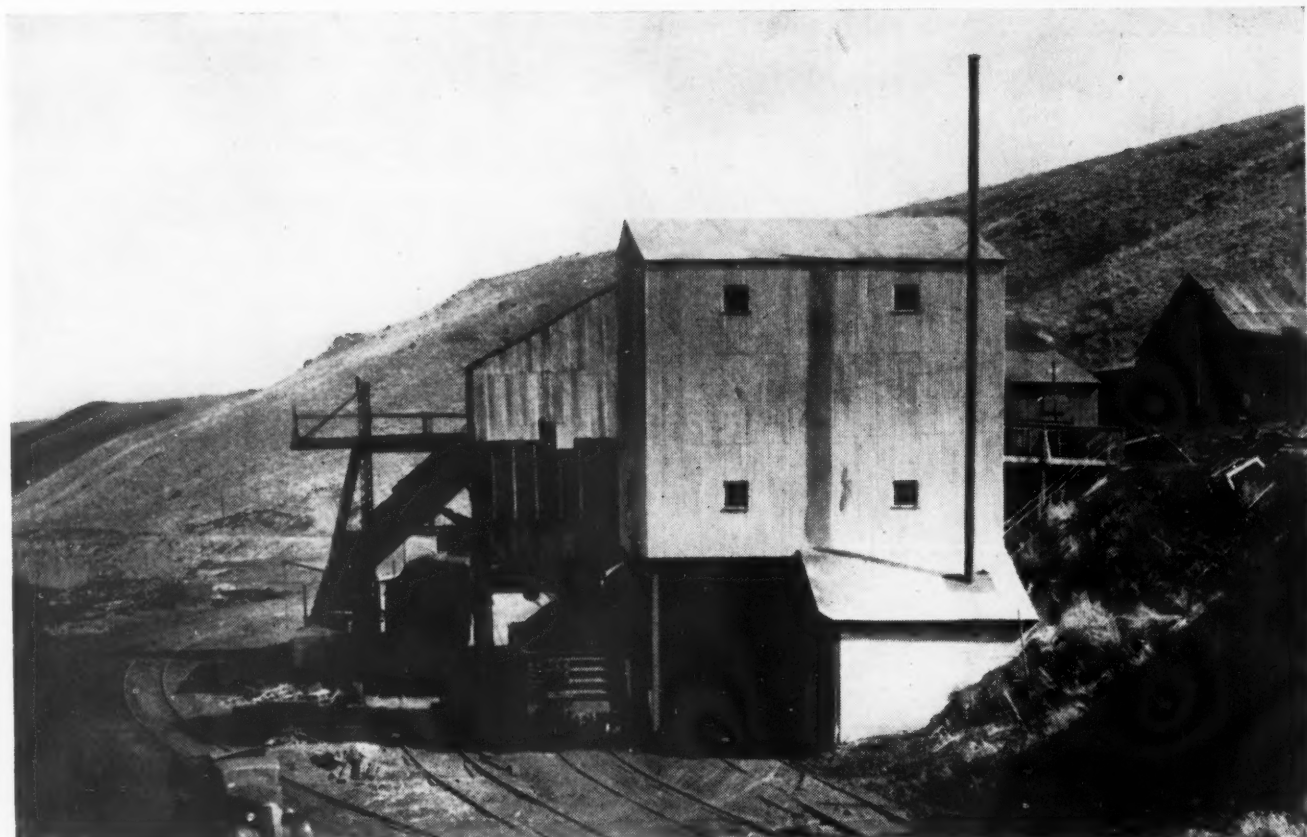
As the dummy line is pulled forward additional troughs are added at the entry and each one is loaded with the necessary supplies. This is continued until the room is half its ultimate depth. At that time sufficient troughing and supplies are in the dummy line to complete the room.

In a straight move-up in entry work, the dummy line is started just inby the cross-gathering conveyor.

One supplyman, by use of the dummy trough line, can keep two face crews supplied with material required at the face. He is assisted in handling trough for the dummy line by the supplyman on the opposite side.

The complete planning, projection and selection of equipment for this new mine received the constant and careful attention of our president, D. W. Martin. The successful installation of the shaker and belt conveyors has been due to the initiative, efforts and cooperation of all the mine personnel under the direction of James Gilchrist, superintendent; James Scott, assistant superintendent; C. L. Sammons, general mine foreman; R. Pegram, assistant mine foreman; C. White, night mine foreman; J. Hensley, safety engineer; and John Popovich, chief electrician.

The Wyatt Coal Co. was organized in 1905. The Sharon and Laing mines were opened in 1906 in the Dorothy seam and are still in operation. Eskdale mine was opened in the Dorothy seam in 1931. The new No. 2 Gas and Eskdale mines utilize the same tippie, producing 2,000 tons per day.

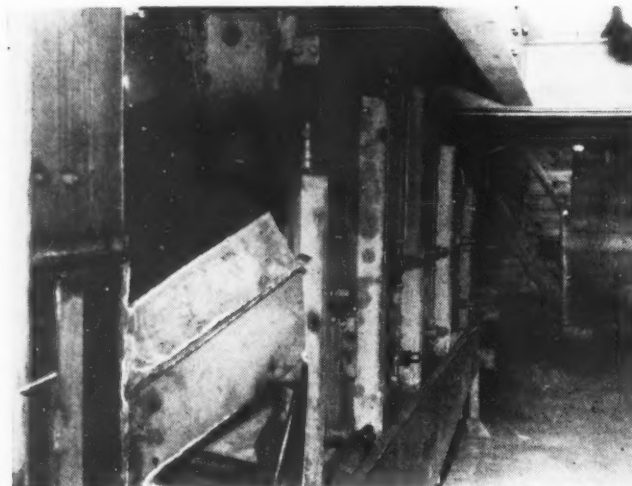


PREPARING NUT AND STOKER, the new washery at Smokeless and Sootless mine was built on this side of the previous tippie. The mine ships in box cars, open-top equipment and trucks.

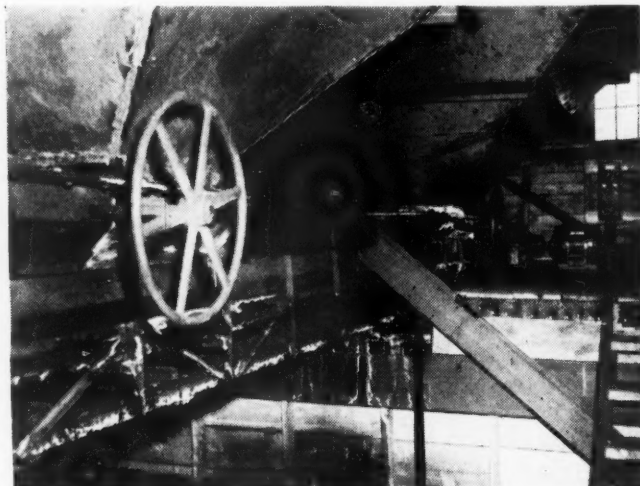
Washery Small but Efficient

Offering a Highly Improved Nut and Stoker Through Installation of Washing Equipment, Brophy Coal Co. Increases Market Acceptance—Low Cost, Simplicity and Efficiency Are Features of the New Plant

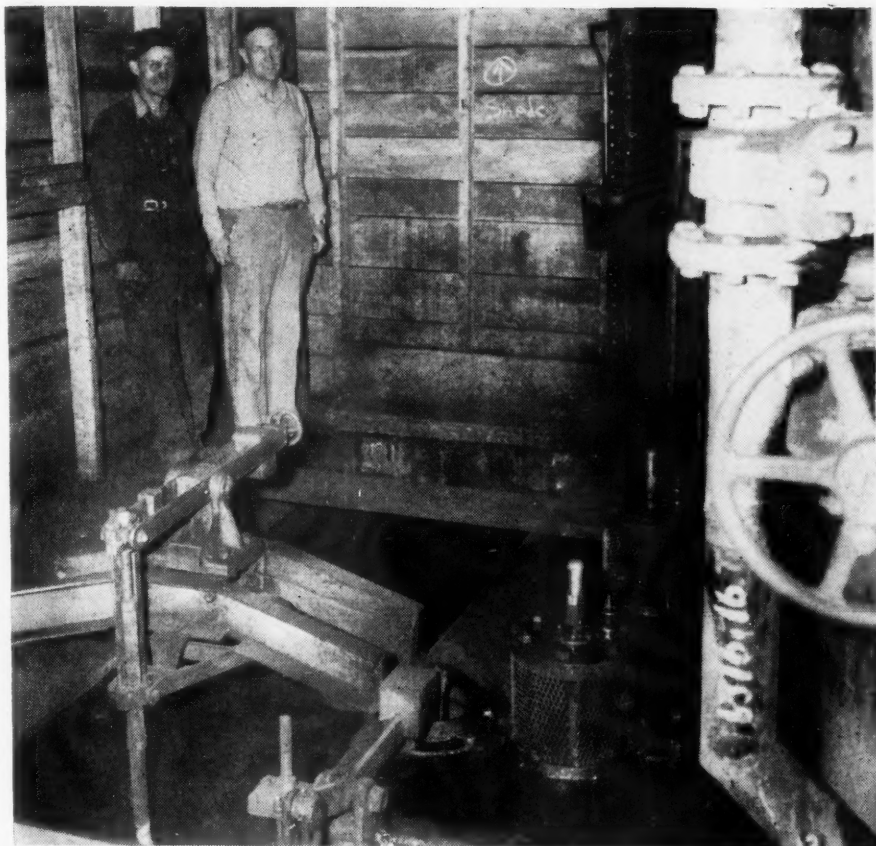
COAL that works better for the user has always been the No. 1 goal of James R. Brophy, of Red Lodge, Mont., owner and operator, under the name of the Brophy Coal Co., of the Smokeless and Sootless mine. The mine was named for the chief characteristic of the product. Now,



FINAL WASHED-COAL SIZING is done on this double-deck vibrating screen producing $4 \times 1\frac{1}{4}$ nut and $1\frac{1}{4} \times \frac{1}{2}$ stoker.



TWO 40-TON WASHED-COAL BINS provide nut and stoker storage and feed to the conveyor for loading.



NUT AND STOKER ARE CLEANED in this three-cell air-operated jig. In the rear are James R. Brophy, owner (right), and John Hagerty, plant operator.

through the installation of air-operated washing equipment for nut and stoker, the product has been further improved by backing up inherent smokeless and sootless qualities with cleanliness and uniformity.

Efficiency Stressed

Because the mine was projected and developed on a modest, though efficient, basis, improving preparation involved designing a plant that would provide the necessary cleaning results but still would be simple to operate and low in cost. The problem was put up to the McNally-Pittsburg Mfg. Corp., which evolved a design based on screening on vibrators and cleaning in a No. 1 three-cell McNally-Norton automatic washer. Storage and loading bins are provided for the washed nut and stoker. The latter is de-watered to below the freezing point by over-night drainage, and the plant is built with everything under cover for protection in the winter months. Except for loading into box cars, operation of the plant is handled by one man part time.

The Smokeless and Sootless mine, which ships from Bearcreek on the Montana, Wyoming & Southern

R.R., which feeds to the Northern Pacific, produces from the No. 2 seam some 76 in. thick. The coal is classed as medium volatile in the semi-bituminous range. It stores well in comparison with most western coals, and is free-burning with a fusion temperature (stoker size) of 2,200 deg. F. The stoker size has a heat content of around 11,400 B.t.u. as-received and 11,950 moisture-free. Short flame duration makes the coal especially suitable for powdered fuel for dry-process cement plants. Other industrial and commercial users include sugar plants, dairies and canning plants. In making cheese or butter, for example, 1 lb. of coal is used per pound of product. The major market, however, is domestic. Nut is especially popular with farmers. The market area extends from the West Coast as far east as the Dakotas.

As it comes from the mine, the chief impurities in the coal are rock, mostly from the top; bone—largely heavy—in the seam; and sulphur from sulphur bands. Since the impurities tend to concentrate in the nut and stoker sizes, their improvement was the No. 1 goal in installation of washing equipment. It involved, among other things, changing the stove size from 6x2½

to 6x4 to put the 4x2½, almost impossible to pick by hand, into the washer. The washer also has eliminated the wide swings in ash content previously experienced. Without washing, the ash content of the nut size, for example, was known to vary up to 20 percent or more. Now the average is 7.8 percent with very little variation from day to day.

Plant Builds Business

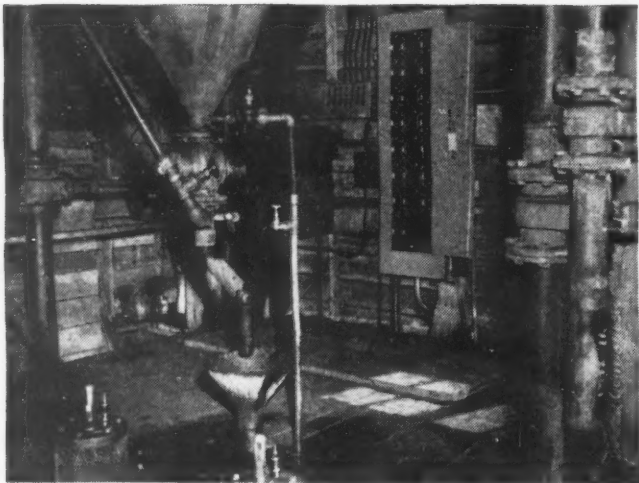
The plant went into operation Feb. 20, 1947, and has resulted in a major increase in business and a better realization, because it made it unnecessary to sell off-average production at a sacrifice or combine it with other sizes to move it. In operation, the coal is dumped into a 5-ton hopper in the original tippie. From the hopper it is discharged onto the main shaker for separation into 4x0, 4x6 stove and plus 6-in. lump. The stove and lump are hand-picked and loaded, usually into box cars with Ottumwa loaders.

The 4x0 from the main unit is elevated to a trommel screen, where the ½x0 is removed to a 50-ton storage bin for chute loading. The average ash of the ½x0 is around 12 percent, since the impurities at the mine tend to concentrate in the larger sizes.

The 4x½ from the trommel is the feed to the new washery plant. It first goes to a bin holding 35 to 40 tons. From the bin an 18-in. reciprocating feeder moves it onto a vibrating degradation screen preceding the wash box. Although the washer has a maximum capacity of 60 tons per hour, the feeder presently is set to deliver only 30 tons per hour. The reserve washer capacity is available to meet peaks and to permit an increase in washed-coal production if warranted in the future.

The degradation screen preceding the washer—a 3x8-ft. single-deck Allis-Chalmers "Low-Head" unit—removes minus 10-mesh fines, which go back to the raw-coal elevator and eventually find their way into the ½x0. Prescreening before washing materially reduces the quality of slurry in the wash-water circuit.

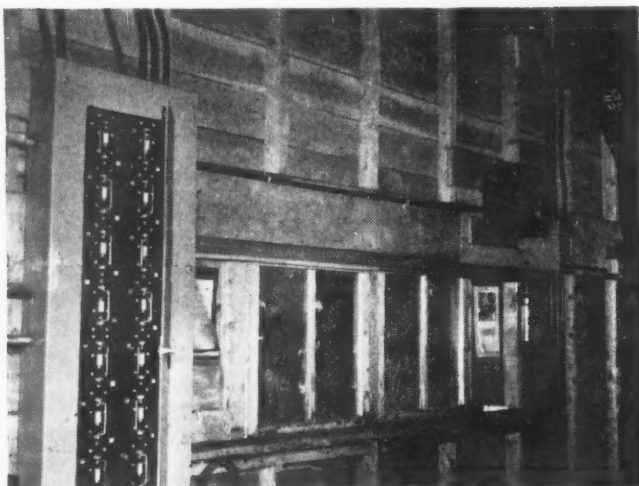
Cleaned 4x½ and water overflow to a 3x12-ft. double-deck "Low-Head" screen, while refuse from the wash-box elevator is discharged into a 5-ton bin equipped with a retractable chute for truck loading. The "Low-Head" screen separates the washed coal into 4x4¼ nut and 1¼x½ stoker on 1¼-in. square mesh (top deck) and 10-mesh stainless with long slots crosswise (bot-



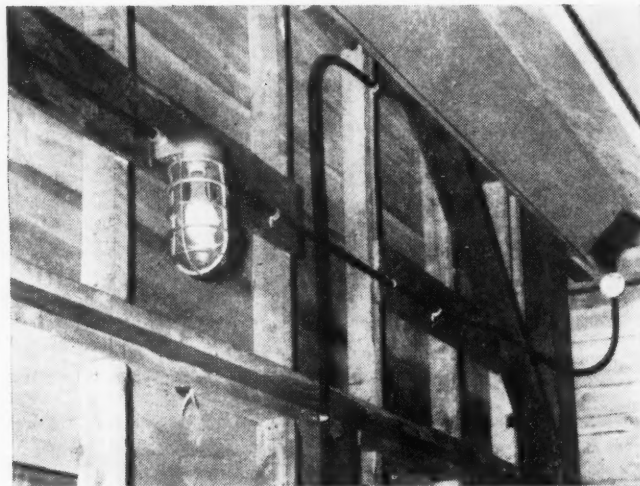
CONTROLS FOR ALL PLANT EQUIPMENT are centered in the panels at the right, which include motor protection.



CIRCUIT BREAKERS to protect each motor are installed near the motors, as shown in this view.



POWER FOR LIGHTING CIRCUITS is provided by this autotransformer (right) fed from the main panel.



LIGHTING CIRCUITS are carried in conduit, with vaporproof fixtures and inclosed switches.

tom deck). The $4 \times 1\frac{1}{4}$ is discharged to an elevator which places it in a 40-ton steel bin. A second elevator and 12-in. screw conveyor place the $1\frac{1}{4} \times \frac{1}{2}$ stoker in a second 40-ton steel bin. Letting the $1\frac{1}{4} \times \frac{1}{2}$ drain overnight in the bin reduces the surface moisture enough to prevent freezing in even the severest winter weather and is a practice regularly followed. A conveyor extending below both bins takes either size to either of two tracks for loading.

Three loading tracks are provided. The No. 1, or outside track, is for large lump, usually shipped in boxcars. No. 2 is for loading either grade of washed coal into open-top equipment. In addition, either washed size or stove or slack can be loaded in open-top or box cars, usually the latter, on the No. 3, or inside, track. One Ottumwa loader serves the washing plant and two others are available for loading lump and stove.

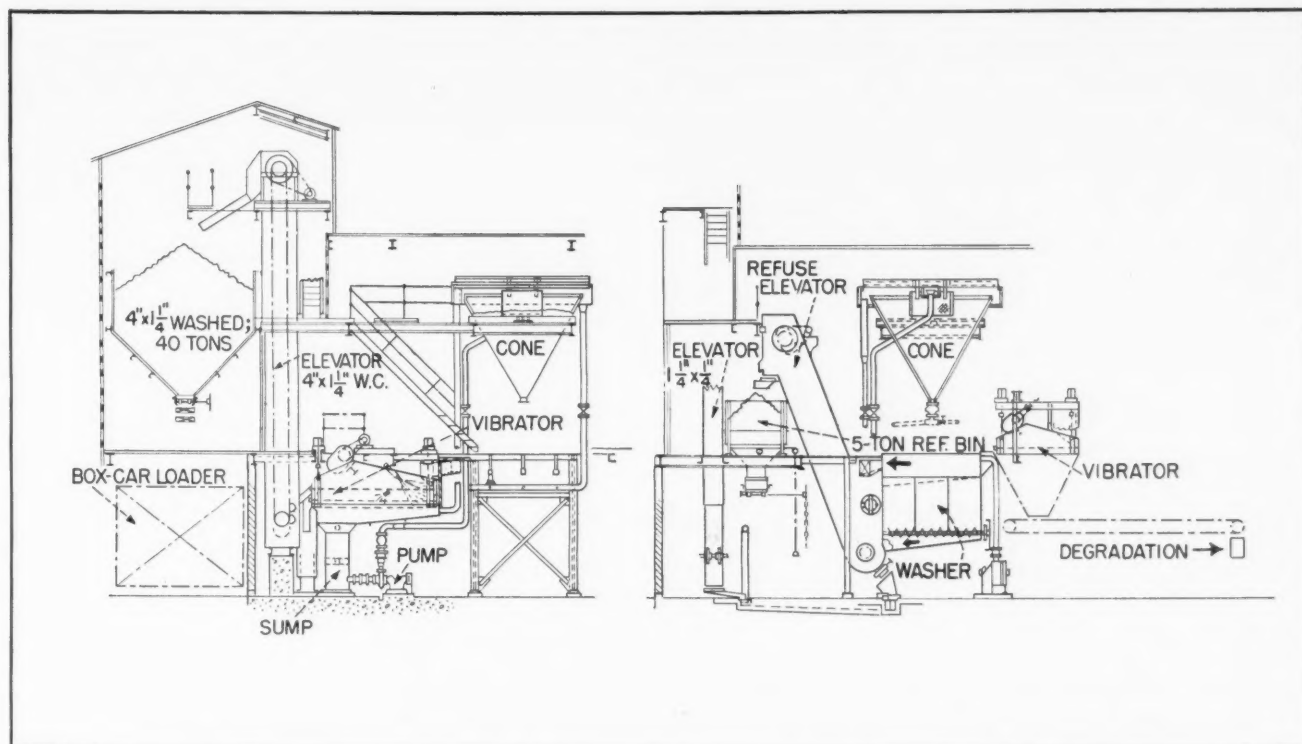
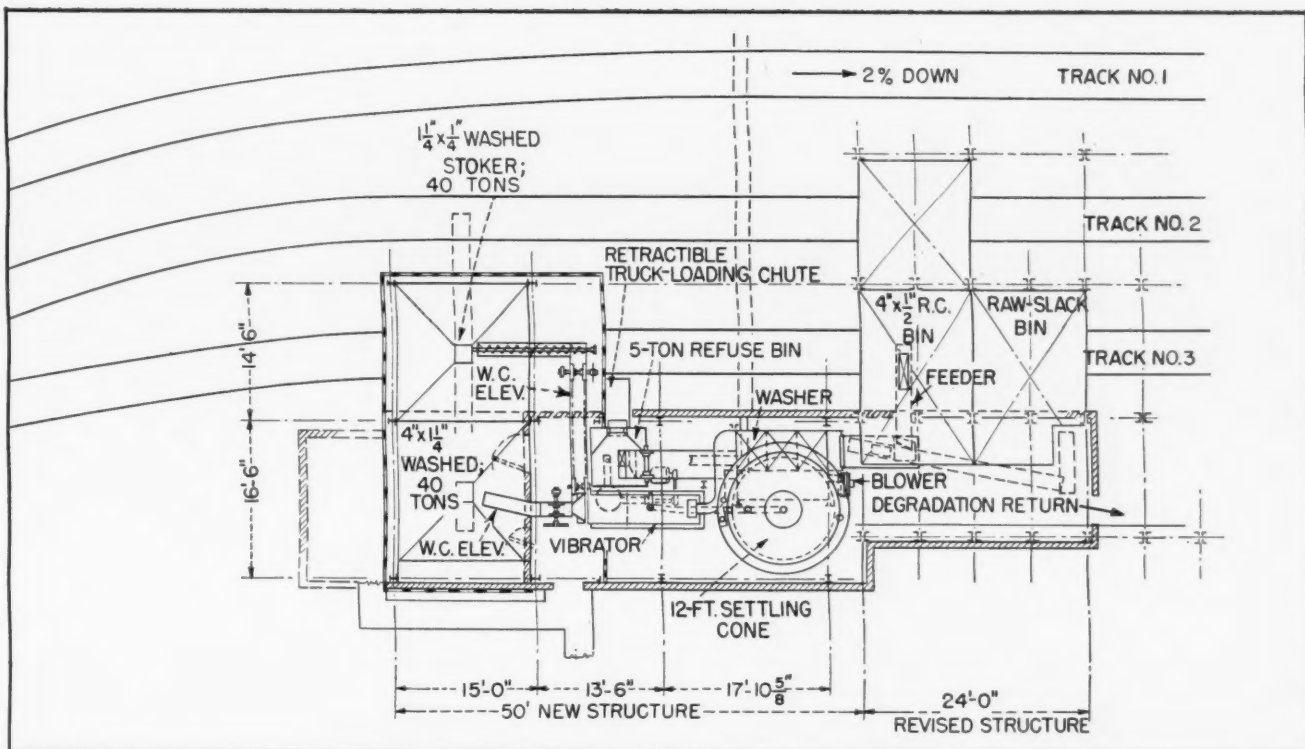
Water and fines through the

washed-coal vibrator flow into a sump from which a 6x4 McNally-Pittsburg centrifugal pump raises them approximately 29 ft. to a 12-ft. settling cone installed inside the plant. The net head on the washer is close to 16 ft. Excess water from the cone returns, via a second down pipe, to the collecting hopper under the washed-coal vibrator. As previously noted, prescreening to remove 10-mesh before washing materially reduces the slurry content of the recirculated water. However, the settling cone normally is dumped once a day. Fresh water is obtained from a spring on the hillside above the plant and is stored in a tank made from an old boiler set on end. From the tank, it flows by gravity to Spraco nozzles on the washed-coal vibrator. The rate of addition through these nozzles is about 25 g.p.m. for an average production of 30 tons per hour.

Structural details include steel frame, wood floors—except for con-

crete in the lower pump floor—wood insulation and corrugated steel sheathing. A partition separates the washer addition from the old plant and, in addition, the washing and bin sections in the new part are divided by corrugated steel. The heating plant is on the lower level in the bin section and consists of a 36-in. hot-air furnace fired by a Whiting stoker. Stoker and blower operation are controlled automatically by a thermostat. In the winter of 1947-48 the temperature dropped to 28 below—the coldest in six or seven years. The stoker feed is washed $1\frac{1}{4} \times \frac{1}{2}$ as necessary. As much as 500 lb. has been burned during the colder winter nights to keep the plant above freezing temperature and have it comfortable for operation the next day.

All motors are 440 volts and are served through conduit from a Trumbull panel, with take-off to an autotransformer for the 110-volt lighting circuits. Fuses in the con-



WASHERY LAYOUT AT SMOKELESS AND SOOTLESS MINE, showing flow of coal and placing of equipment units.

trol panel are supplemented by General Electric circuit breakers. From this central panel on the washer floor one man controls the operation of all equipment by push-buttons. As a rule, the repairman looks after plant operation and does repair work on the same floor. A second man is required when the box car loader is used, which usually is the case. However, practi-

cally all open-top loading is handled by the operator-repairman.

In line with electrical installation standards, all lighting circuits are in conduit and vapor-proof fixtures are employed. They result in a better job and eliminate moisture difficulties.

Before installation of the washing plant, the ash content of the $4 \times 1 \frac{1}{4}$ nut, in accordance with the

tendency of the impurities to concentrate in the larger sizes, ran 18 to 18.5 percent. The average ash content of the washed nut is 7.8 percent. At the same time, the sulphur content was reduced from an average of 1.3 to 0.8 percent.

Washing the $1 \frac{1}{4} \times \frac{1}{2}$ stoker reduces the ash content from around 16.0 to an average of 8.0 percent; sulphur, from 1.3 to 0.8 percent.



STRIPPING AND SERVICE, No. 1 pit, Log Mountain seam—dragline working on the bench, shovel in the pit being serviced and road patrol cleaning coal in preparation for loading.

Shovel and Dragline Stripping

With Some 135 Miles of Outcrop on Three Seams, Boots-Lippert Strips to 40 to 45 Ft. with Shovel and Dragline Equipment—Tandem Operation Especially Adapted to Finger Work—High-Lift Shovel Newest Unit

USING BOTH shovel and dragline equipment for stripping to a maximum of 40 to 45 ft., the Boots-Lippert Corp. is producing some 7,500 tons a week (four to five days average running time) from three seams 33 to 52 in. thick at Morley, Tenn. Some 130 to 135 miles of outcrop is available for stripping on the two sites now being worked. A third operation is under consideration and additional equipment is being procured to increase output from the present locations. Tandem dragline and shovel stripping is the general rule at one of the two operations now in production, while a new high-lift shovel has taken over the majority of the stripping load

at the other. Shooting is adjusted to throw as much as one-third of the burden into the spoil area without any further handling.

The Boots-Lippert organization originally was a road-building and construction concern, which got into stripping in 1942 in Ohio as a result of the wartime dearth of construction work. Like others, it continued in the work, starting at Morley in June, 1947. The organization is headed by Carl Lippert, president. J. L. Boots is first vice president and W. F. Vincent is second vice president and mine superintendent. R. L. Fielden is pit foreman at No. 1 and R. L. Stanfield at No. 2.

Steep to gently sloping hills are

the rule in the Morley area, with steep work more the exception than the rule. Numerous fingers are encountered, particularly at the No. 1 operation. These, together with some sizable flat areas, permit considerable production from other than straight hillside cuts and particularly lend themselves to tandem dragline and shovel work at No. 1.

Three seams provide the approximately 100 miles of outcrop work plus some flat production at No. 1. The intervals between them are sufficient so that they can be mined in any order without danger of covering the outcrop of one with spoil from another. The top seam at No. 1 is the Log Mountain, 46 to 52 in. thick, exclusive of a top layer of about 6 in. separated from the main seam by 1 to 2 in. of slate. This rider coal and slate are ripped off and spoiled by the stripping units. The Log Mountain coal is very clean, hard and blocky. It is overlaid by 10 to 14 ft. of blue shale, followed by a soft soapy shale



OPENING NEW CUT, NO. 2 PIT, showing the new high-lift stripping unit with twin-diesel power, 45-ft. boom, 37½-ft. handle and 2½-yd. dipper.

and usual surface material above.

Below the Log Mountain is the Rich Mountain seam, 33 to 36 in. thick, clean and hard, and overlaid by 8 to 10 ft. of blue slate, followed by 3 to 4 ft. of hard shale and then soapy shale to the surface material.

The bottom seam being stripped is the Jellico, 33 to 38 in. thick, very clean and hard. It is overlaid by 10 to 12 ft. of blue slate, with generally clay and top soil to the surface where possible to work.

Production at the No. 2 operation is from the Rich Mountain or Jellico, and some 30 to 35 miles of outcrop is available for operation. Overburden conditions are substantially the same as at No. 1, but fingers and flat areas are less common.

Equipment at the No. 1 operation at the time this article was written included the following:

Stripping—One No. 8-D Northwest dragline with Cummins diesel engine, 65-ft. boom and 2½-cu.yd. Page bucket working in tandem with a Bucyrus-Erie 48 B shovel, Buda diesel and 2½-cu.yd. Esco dipper.

Overburden drilling—Parmanco manual-feed sidewall drill recently

equipped with Kennametal heads. These heads have permitted increasing number of holes from 2 to 3 per shift to 6 to 8.

Coal and miscellaneous drilling—Caterpillar 30 tractor, on which is mounted a Davey compressor for drilling boulders and for putting holes in coal to let the loading shovel break in. Other than breaking in, however, the coal is loaded without shooting.

Coal loading—Lorain 75 shovel with 1½-cu.yd. dipper, powered by Waukesha gas engine.

Miscellaneous—Caterpillar D-8 tractor with La Plant-Choate bulldozer for general service, including knocking down trees, opening up ahead of the strippers, road construction and maintenance and so on; one 6-in. and several 2½-in. pumps, and one Caterpillar 212 diesel road patrol for road maintenance and coal cleaning.

Coal haulage—One company-owned Ford truck with 7½- to 8-ton Gar-Wood body and the following trucks operated by Alonzo Cox, haulage contractor: Three Macks, two Federal and one GMC, with 10- to 11-ton end-dump bodies.

It is expected that a Lima 1201

high-lift shovel, when received, will be put in service at No. 1. It will be equipped with a 2½-cu.yd. dipper, 50-ft. boom and 47-ft. dipper handle.

Equipment at No. 2 includes the following:

Stripping—One new Manitowac 3500 high-lift shovel, twin D 8 diesels, 45-ft. boom, 37½-ft. dipper handle and 2½-cu.yd. dipper.

Overburden drilling—New McCarthy hydraulic sidewall drill using Kennametal pilot-type bits, selected because they increase drilling speed and also provide more positive control over hole direction.

Coal and miscellaneous drilling—Schramm rubber-tired compressor.

Coal loading—Koehring 604 shovel with Waukesha-Hesselman diesel and 1½-cu.yd. Pettibone-Mulliken coal dipper. This shovel also is used for opening up part of the first cut.

Spare service—Lima 1¼-cu.yd. shovel with Waukesha motor.

Miscellaneous—International Harvester TD-18 tractor with La Plant-Choate bulldozer; 2- and 2½-in. pumps.

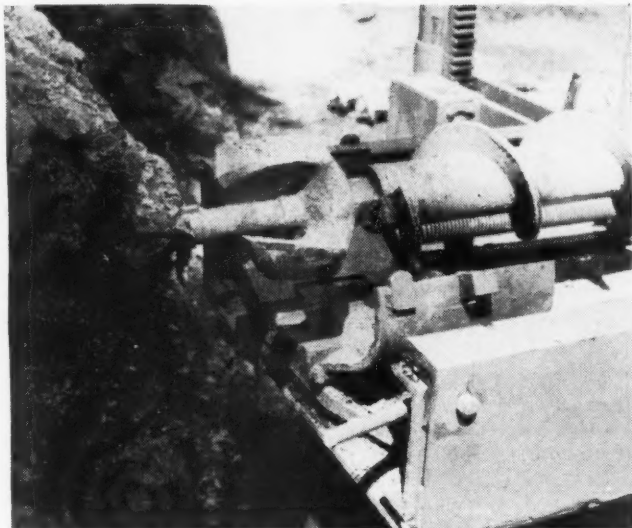
Coal Haulage—Four new company-owned Ford F-6 trucks with Marion 12x7-ft.x48-in. 10-ton end-dump bodies; trucks equipped with extra springs and otherwise adapted to the service, including installation of 9x20 Firestone Rock Grip tires. Two additional units were on order for future delivery.

Tandem Finger Work

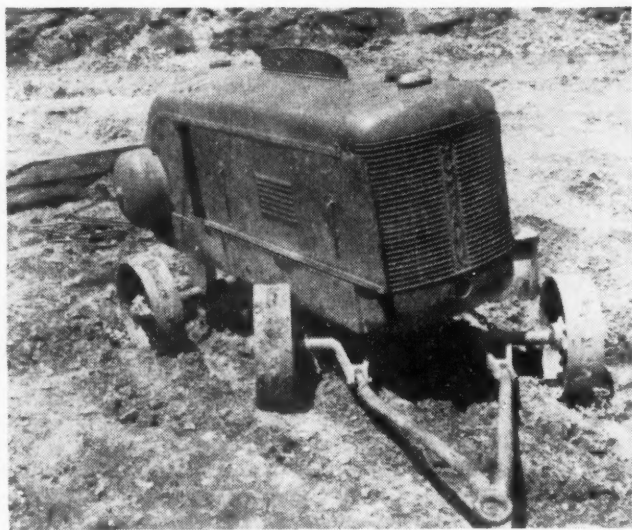
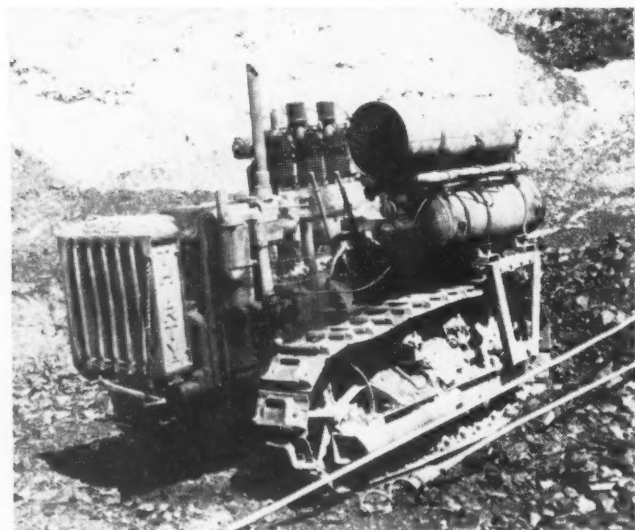
Development and production at No. 1, where tandem operation is the rule and fingers are frequent, is shown diagrammatically in Fig. 1. As a result of tandem operation, it is possible to take cuts as much as 150 ft. wide and mine out fingers up to 300 ft. wide in two such cuts, one on each side. As shown in Fig. 1, the dragline works on a bench up to 18 ft. or so high. It goes ahead of the shovel making a cut up to 50 to 60 ft. wide. Following just behind, the shovel makes a 30- to 35-ft. wide cut, throwing its spoil over for the dragline to pick up and put away. Preliminary cleaning and the cutting of a roadway for the dragline is done by the bulldozer. Putting the dragline up on the bench also increases its casting range.

When the dragline and shovel reach the end of the finger or other pit limit, the dragline starts back, digging up and casting the bench on which it rides to complete the opening of the pit which, as stated,

Drilling and Haulage at Boots-Lippert Pits



NEW HYDRAULIC OVERBURDEN DRILL (left) uses pilot-type head with tungsten-carbide insert cutting tips (right) for faster drilling and better hole direction.



FOR MISCELLANEOUS DRILLING, No. 1 pit employs the compressor mounted on a tractor (left); No. 2 the wheel-mounted unit shown at the right for miscellaneous pit work.



PART OF THE FLEET of new trucks, to total six eventually, used for coal haulage on the No. 2 side.



TRUCK FROM NO. 1 SIDE dumping into hopper ahead of belt to preparation plant. No. 2 road is at the right.

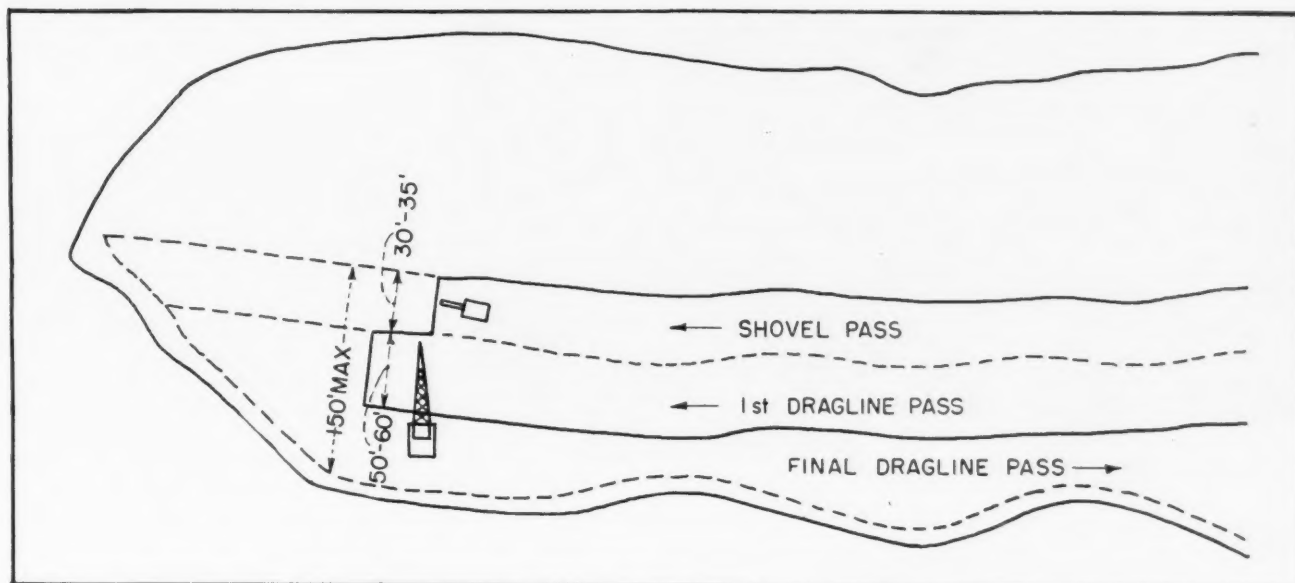


FIG. 1—TANDEM OPERATION with dragline and shovel on No. 1 side.

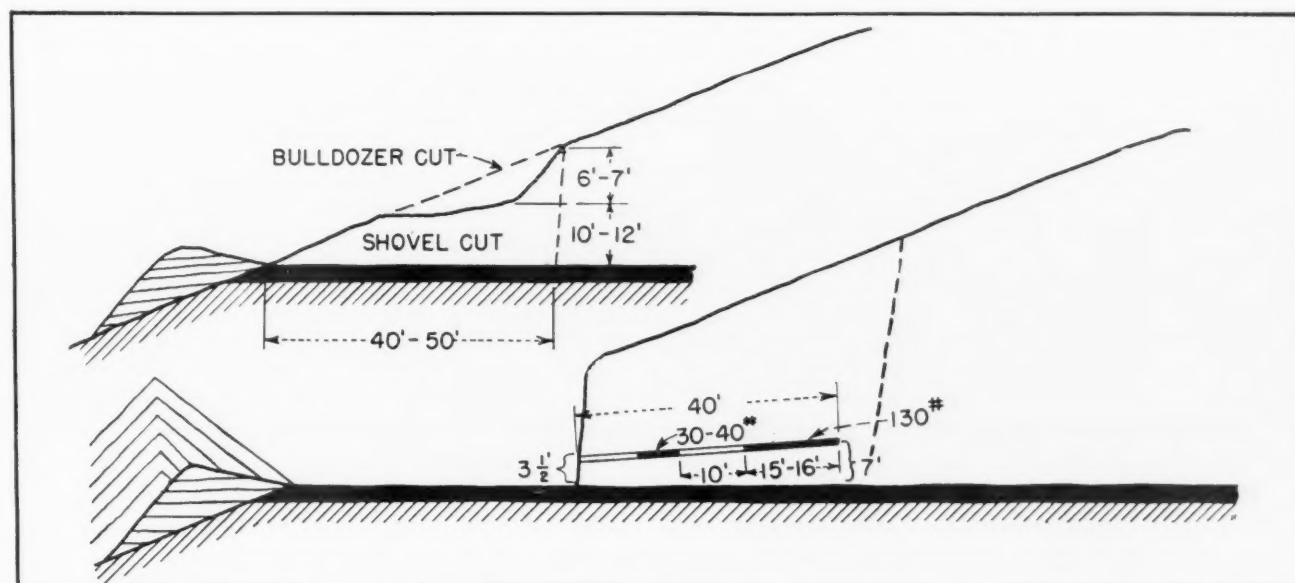


FIG. 2—DEVELOPMENT AND SHOOTING plans, No. 2 side.

may be as much as 150 ft. wide. Loading of the coal is done as desired and part or all of it may be taken, the trucks operating, as conditions dictate, on the coal, the bottom or over a road bulldozed out in the spoil. If the units are working on a hillside, successive cuts are taken in the same fashion until the highwall limit of 40 to 45 ft. is reached. Where the slopes are gentle, it is possible to go back 250 to 300 ft. or more.

In developing at No. 2, where only shovels are employed, the first cut makes use of the bulldozer, stripping shovel and loading shovel when the latter is available. The general plan is shown diagrammatically in Fig. 2. Width of the first cut usually is 40 to 50 ft. The bulldozer scalps off the surface mate-

rial to a depth of some 6 to 7 ft. on the inside. The loading shovel then comes in and takes off the remaining material to the coal—usually 10 to 12 ft. In the process, it faces up the blue shale over the coal ready for drilling and shooting. Subsequent cuts then are handled by the stripping unit.

Fig. 2 also shows the drilling plan generally employed at No. 2. The same plan also is followed at No. 1. Hole depth usually is 40 ft., making, with breakback and shovel clean-up, a cut about 45 ft. wide. Holes are drilled on 18-ft. centers, starting about 3 1/2 ft. above the coal and angling up to about 6 ft. at the back. Charges frequently are split, as shown in Fig. 3, with the heaviest—130 lb.—at the back and extending out some 15 to 16 ft.

Then a 10-ft. air space is left and 30 to 40 lb. more is placed. The explosive is 40 percent duPont dynamite, usually in 5x14-in. cartridges, although 5x16 is used at times.

With this drilling and charging plan it is possible, if the blue slate is hard, to throw up to 30 percent of the overburden over into the spoil area without further handling. The management feels the extra money for powder is more than offset by reduced fuel, labor and wear and tear on the machines, particularly the latter.

No. 1 coal is hauled an average of 2 1/2 miles to a 300-ton bin from which a belt conveyor moves it to the tippie and washery. No. 2 coal is hauled an average of one mile to a ramp in a raw-coal storage yard, from which it is back-conveyed into



ONE OF THE TWO portable gasoline welders with the towing jeep that also carries the gas cylinders, welding and cutting equipment and tools.



FUEL-SERVICE TRUCK carries 400 gal. of diesel fuel and 175 gal. of gasoline. Hand-operated winch and boom mounted on the front has a 1/2-ton capacity.



R. L. FIELDEN (left), foreman, No. 1 pit, with W. F. VINCENT, second vice president and mine superintendent, Boots-Lippert Corp.

the preparation plant as the operating schedule of the plant permits.

Coal from both operations is sized, washed and loaded through a modern four-track preparation plant. Clean loading in the pits is emphasized. The coal is broomed to remove surface dirt and all rash is bladed off before loading. Whatever slight impurity content is present thereafter is completely removed in the washery prior to final loading.

The loaded haul from both operations is downhill or level. Part from No. 1 is over the public highway. Company roads are made by working up a base and then putting on about 2 in. of crushed rock, letting the trucks key it into the base. Additional 1-in. layers of crushed rock are spread and keyed in in the same fashion until a firm, smooth running surface is secured. As a rule, maximum grades on the hills are kept to not more than 7 or 8 percent.

Auxiliary equipment includes a war-surplus Chevrolet truck for fueling equipment in the field. A dual tank carries 400 gal. of diesel fuel and 175 gal. of gasoline. An engine-driven pump is provided for dispensing both products through hoses to the machine fuel tanks. A small hand-operated winch and boom with a capacity of about 1/2 ton is mounted on the front.

Field Maintenance the Rule

All repairing of equipment, except for relining truck drums and miscellaneous work on small parts, is done in the field, including dippers, sticks, booms, engines and other shovel, dragline, tractor and dozer parts. Shovel teeth are fitted with caps brazed on. When worn, these are taken off and discarded. Spots on both dippers and buckets subject to the most wear are hard-surfaced with stainless rod, including back of the lip and on the bottom corners, both inside and out.

Two portable welding machines handle a lion's share of the repair work. One is a 300-amp. Lincoln machine mounted on a two-wheeled semi-trailer. The power is a gas engine, but the welder also can be operated by electricity when desired. The second is a 250-amp. Hobart unit with Wisconsin engine mounted on four rubber-tired wheels for towing. The towing unit, which also carries gas cylinders, welding and cutting equipment and tools, is a Willys Jeep, which also transports the usual two-man repair and welding crew.

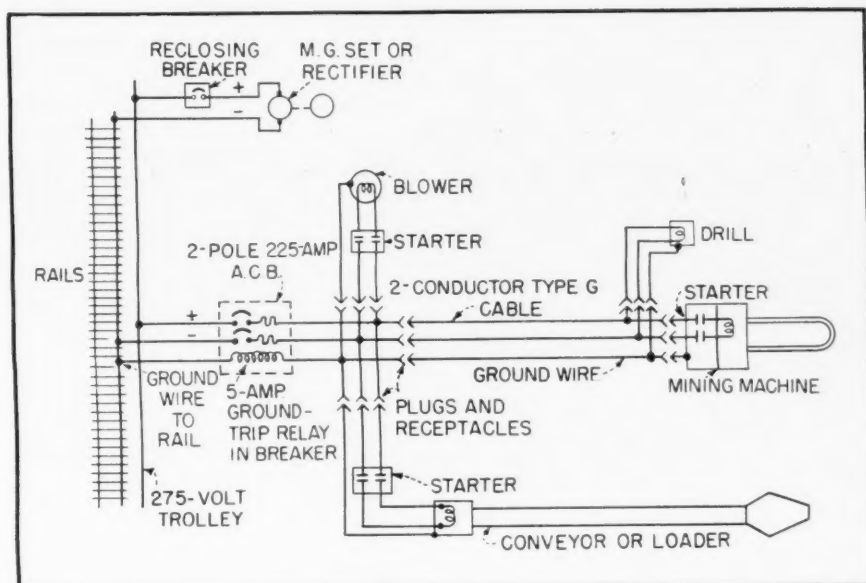


FIG. 1—TYPICAL 275-VOLT D.C. distribution system with grounding protection for the equipment employed in one working place.

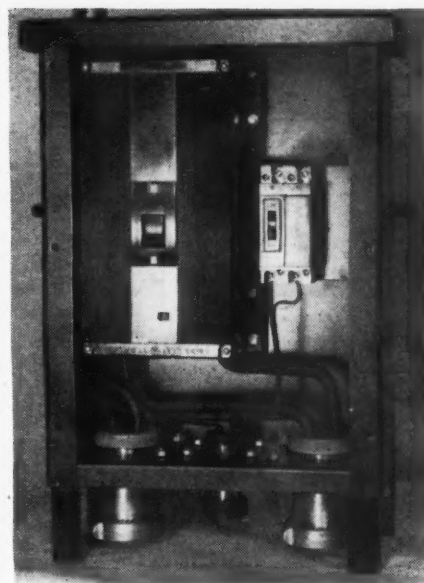


FIG. 2—MAIN CIRCUIT BREAKER with ground-trip coil, plus small unit for drill.

Grounding Off-Track Equipment

Air Circuit Breakers with Ground-Trip Relays and Ground Wires to Machines Not Only Protect Men But Also Equipment—D.C. and A.C. Protective Systems and Equipment—The Cost of Adequate Ground Protection

By JOSEPH A. SETTER
Industrial Engineer, General Electric Co., Denver, Colo.

THE PURPOSE of grounding electrically driven mining machinery is to protect men against shock and, at the same time, try to save the electrical equipment itself from serious damage arising out of arcs and short circuits. To provide a safe ground, it is not possible merely to drive a rod in dry coal or rock and expect it to drain a charge of electricity off a mining machine. Electricity cannot be pumped, for example, from a d.c. positive wire that touches the frame of a motor into this ground rod and dissipated. This current eventually must get back to the negative terminal of the d.c. generator.

If the ground-rod resistance is high, as in dry soil, very little current flows and the full generator

voltage of, say, 250 volts, appears on the motor. If a man happens to be standing in low-resistance wet coal and touches this motor, the current will pass through his body on its way back through the earth to the generator. The result is shock or electrocution. The answer to the problem is a low-resistance ground wire that will bypass the man and carry the short-circuit current directly to the rail and thence to the generator negative. By inserting a fuse or circuit breaker in the line, the current flow can be limited before destructive conditions occur.

This, in general, is the basis for the safety grounding of electrical equipment in and around the mines that has been a much-discussed subject for many years. The advantages and disadvantages of frame grounding will be presented in the following discussion, along with suggestions for protecting a sub-

stantial investment in mining machines and keeping them producing coal with less maintenance by means of adequate circuit breakers.

Grounding Advantages

Other industries have accepted machine grounding as a standard safety requirement and generally adhere to the standards of the National Electrical Code, but the mining industry has been somewhat reluctant to accept such standards. Why is this? Should ground wires and protective equipment be installed only because of the Federal Mine Safety Code or are there other benefits? After all, a coal operator is in business to make a profit and any extra investment in equipment must produce benefits to justify the expenditure.

Does hesitancy arise from the fact that such protection may be expensive or from the false impression received from comparing the relative number of accidents caused by electric shock with the number from other causes, such as roof falls, haulage, etc.? Shocks from machine frames are quite common. Fortunately, such shocks are not usually severe enough to cause serious injury and the conditions that cause them generally are not reported. Nevertheless, any electrical shock is likely to have serious results by throwing a man off bal-

Abstract of paper entitled "Grounding Off-Track Mining Machinery and Protection of Equipment With Circuit Breakers," presented at the 1948 meeting of the Rocky Mountain Coal Mining Institute.

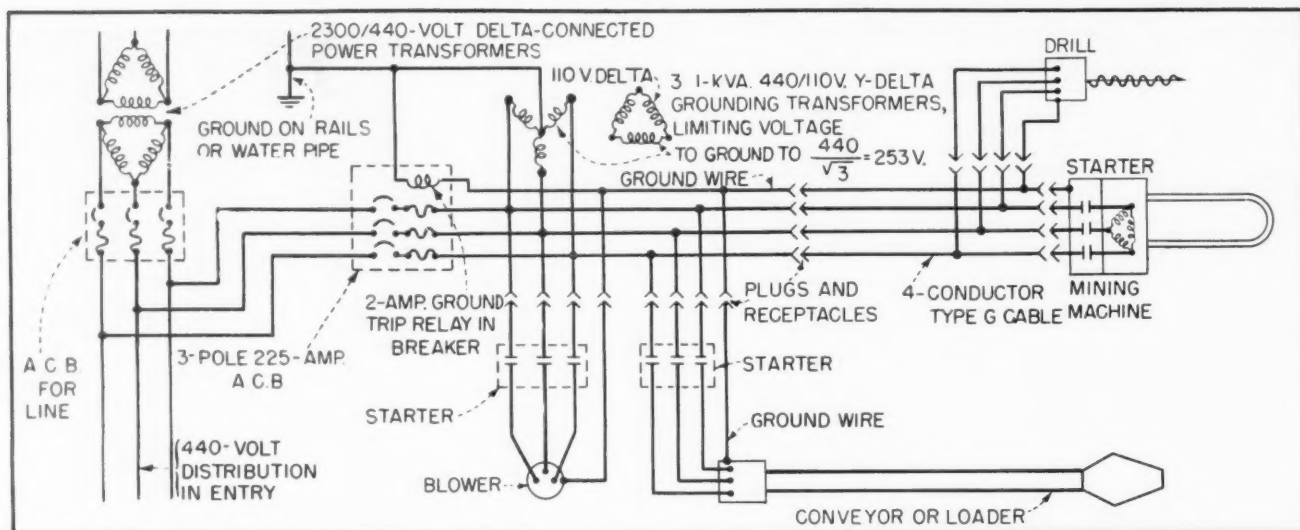


FIG. 3—TYPICAL 440-VOLT A.C. distribution system with grounding protection for one room using Y-delta grounding transformers.

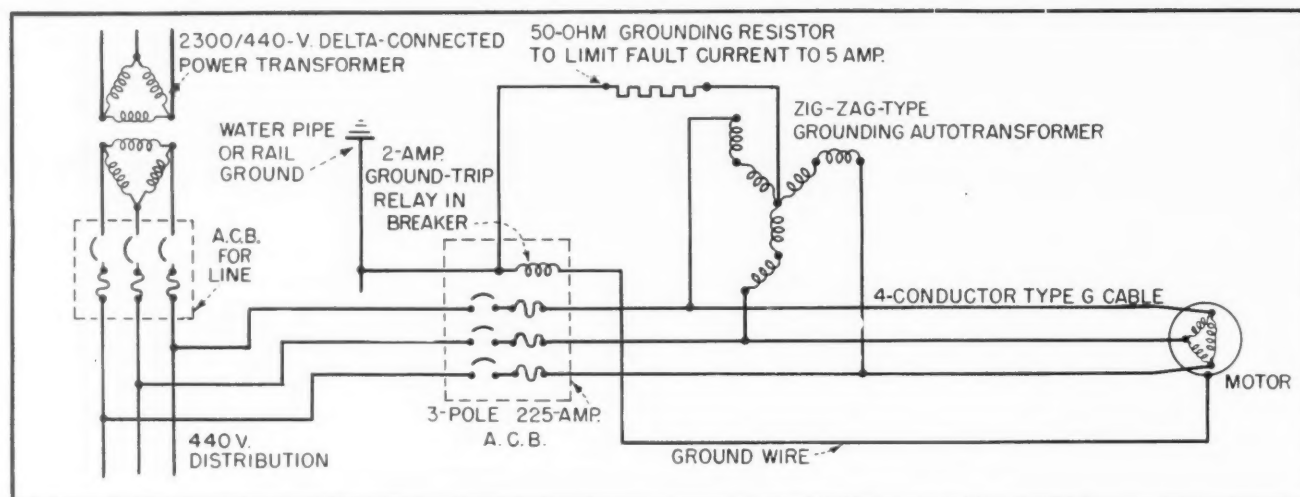


FIG. 4—TYPICAL 440-VOLT A.C. distribution system using zig-zag-type grounding autotransformer.

ance and into moving machinery.

Such an accident may not be blamed on the electrical equipment. Directly or indirectly, however, it is an economic loss to all. The miner may lose his earning power for life and his dependents may be deprived of a chance at a reasonable standard of living. The insurance company stands to lose many thousands of dollars. The operator loses tonnage and pays out many dollars for non-productive labor in addition to the expense of training a new man. Furthermore, as a result of the electrical failure that caused the shock, destructive arcs or heavy flows of current can burn out a winding and render a machine useless. In addition to the lost tonnage and higher cost for that shift, the machine may be out of service for several weeks while it is being repaired at considerable expense.

All these hazards and expenses can be eliminated by using a simple ground wire in conjunction with an

adequate air circuit breaker with suitable tripping relays.

It should be emphasized at this point that the ground wire by itself protects *only* the workman against shock by diverting the current from him or by draining static charges off belts and shuttle cars. The ground wire does not protect the motor, cable or controller unless the ground or short-circuit current is removed immediately. In fact, the ground wire alone can become a detriment because the arcs from insulation failure or flashover of electrical contacts can burn holes through a motor case or start a cable fire before a fuse can blow. A fuse must be large enough to handle the starting current or the heaviest overload on the mining machine—usually 200, 300 or 400 amp. If the insulation failure in the motor is of such magnitude that, say, only 100 amp. flows, the fuse would never blow and the motor probably would burn up.

Recently, where a 250-volt d.c. 200-amp. fuse protected a working place, a cable failure in the middle of a 300-ft. length started a fire that involved the whole coal seam. The 200-amp. fuse never blew because resistance probably limited the current to about 100 amp. This could have been disastrous if the fire had not been put out quickly.

The only way to protect against such situations is to use an air circuit breaker equipped with a small relay connected in the ground-wire circuit to trip the breaker on a small flow of current, say 2 to 5 amp., rather than permitting a current of several hundred amperes to flow before the breaker operates. By tripping the breaker in a fraction of a second with only 5 amp. flowing as a result of a fault condition, it is apparent that a potentially destructive arc in a motor or cable will be snuffed out before it can do any serious damage. The electrician or the machine boss

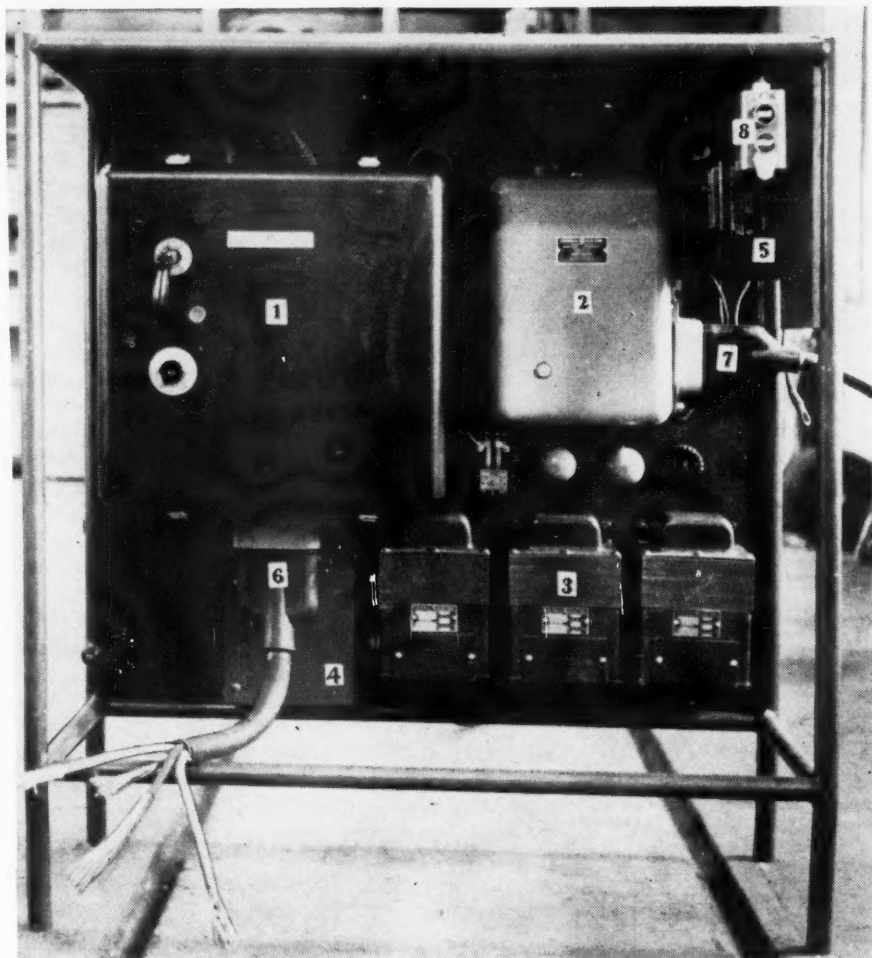


FIG. 5—CIRCUIT-BREAKER unit for protecting conveyor unit, 440 volts a.c. Components are: (1) main circuit breaker; (2) magnetic starter for conveyor; (3) grounding-transformer bank; (4) circuit breaker for blower; (5) pushbutton for conveyor starter; (6) four-conductor plug and receptacle for mining machine; (7) same for conveyor motor; (8) small relay to light lamps showing ground.

many times can find the weak spot in the insulation and make a simple repair that might save the whole machine, thus offsetting the cost of the circuit breaker many times.

The cost of the special ground relay in the breaker is only about \$35 at present prices. This cost, together with the extra cost of the ground wire in the cable and plugs, is all that should be charged to the grounding system. The remaining circuit-breaker cost really should be charged to the improvement of inferior fuse protection or to providing adequate overload protection where none previously existed. A major advantage of the modern air circuit breaker therefore is that expensive mining machinery, for the first time, can now be protected against abusive overloads and short circuits. Breakers cannot be blocked in or closed on a short circuit and the men cannot change the overload trip setting.

If a breaker trips, it is a simple matter to reclose it, using the han-

dle, in a few seconds. No production time or wages are lost while men are hunting for a new fuse or cutting a length of trolley wire to substitute. The average time lost when a fuse blows is at least 15 minutes. Maintenance of mining machinery should be reduced by preventing burnouts resulting from excessive overloads. In addition, the men will work harder at handling the machines correctly if the breakers trip out too frequently. There are no exposed current-carrying parts in breakers and this should prevent shocks and increase safety. These and many other advantages result from the use of ground wires in conjunction with modern circuit breakers.

Grounding Disadvantages

1. The cost of the trailing cable is increased. True, but the difference in cost is not so great in view of the advantages previously out-

lined. For example, many mines with d.c. power use a two-conductor No. 2 flat conventional cable which costs about 58c. per foot. The same cable with a flat ground wire between the power conductors, costs about 24 percent more. If round cable is preferred, the cost of the ground wires is about 7 percent more.

For 440 volts a.c., a regular three-conductor No. 6 Type W cable usually costs about 50c. per foot and is 1 in. in diameter. The same size of cable with three small ground wires in the spaces between the power wires, known as Type G, costs about 54c. per foot. The difference is approximately the same with other sizes.

2. Present trailing cables must be discarded or used elsewhere. However, cable is expendable and its life is relatively short, providing an opportunity for replacement upon wearing out, if not before. In some instances, where 440-volt a.c. systems are employed, it may be possible to sell existing cables to mines operating on d.c., thus partially paying for the new Type G.

3. Weight and size of cables are increased. This is not too important unless cable reels are used. However, new designs will be very little larger or heavier.

4. Splicing of cables containing ground wires is more difficult. While this is true, it also means that splices must be properly made or the breaker will trip out. The result, therefore, should be better splices and a reduction in fires. Cables might be installed in certain standard lengths with cable plugs and receptacles. Then, a defective cable could be replaced with a spare immediately and the faulty length sent to the shop for proper vulcanizing. This probably would increase production enough to more than offset the cost of the spare cable and plugs.

In addition, there are other minor grounding difficulties that are minimized or eliminated if the ground-tripping relay and circuit breakers are used.

D.C. Grounding

Fig. 1 shows schematically a simple and effective method of grounding face equipment in a typical room-and-pillar operation. D.c. at 275 volts is fed to the positive trolley through a reclosing circuit breaker rated at 600 to 1,200 amp. The negative connects to the track system, which should be adequately

bonded. This track then is considered at ground potential since it is in contact with the floor at numerous places throughout the mine. The track provides a low-resistance path from the off-track mining machines back to the generator when a ground wire is used.

A two-pole air circuit breaker of adequate size to handle all the equipment in the room is installed in fresh air at the room neck. It has been found that a 225-amp. breaker usually is sufficient under the conditions shown. The breaker is fitted with two overload trip coils adjustable from 80 to 160 percent. A two-conductor cable with ground wire extends to the mining machine some 300 ft. away, and three conductor plugs and receptacles generally are used to simplify the changing of cables or machines.

In addition to the usual overcurrent trip coils in the breaker, an additional coil designed to trip the breaker when the current through it is only about 5 amp. is added to the unit. It will be noted that this coil is between the rail and the ground wire to the frame of the mining machine. Normally, no current flows if the cable and motor are in good operating condition. If, however, the insulation fails or the motor flashes over, a positive potential of, say, 275 volts appears on the machine frame and current starts to flow in the ground wire. When the current approaches 5 amp., the breaker trips in a fraction of a second and cuts off the power. If the negative shorts to the frame, negative and ground wire in parallel carry the load current and trip the breaker.

Motor Damage Avoided

Short-circuit arcs require a period of time to damage a motor. Consequently, immediate interruption of the current before it reaches damaging values usually will save a motor from destruction and permit keeping it in operation with only minor repairs. If this ground relay were not used, a short circuit current equal to the maximum setting of the overload trip coils—some 400 to 500 amp.—would flow before the breaker tripped or the fuse blew if a fused switch was used. The ground wire also protects the workmen from shock because it has a very low resistance, some $\frac{1}{2}$ ohm or less, and therefore bypasses all the current from them back to the track.

It will be noted that only one circuit breaker is used for all the

equipment in one working place. The conveyor or loader, the blower and the drill all connect to the breaker through their respective control equipments or starters. These starters should provide the normal overload protection for their motors called for in Sec. 6a of the Federal Mine Safety Code, relying on the main circuit breaker to open when a short circuit or ground occurs. Fuses or air circuit breakers cannot adequately protect against overload unless they are set very low.

Ground Quickly Isolated

The ground wires from all motors connect to the common ground-trip coil and a ground on any unit will shut down everything. By disconnecting each plug in turn, the ground can be isolated quickly and the defective equipment replaced or repaired. It is possible, of course, to install a separate breaker with ground trip for each motor but this increases the cost many times. The one-breaker system is economically sound if a heavy-duty air circuit breaker is used, since many mines do not cut and load coal simultaneously. If cutting and loading is done together, a breaker of twice the ampere rating would be required in any event, and it usually is less expensive to purchase two 225-amp. breakers than one 450- to 600-amp. unit.

On the drill circuit, a small 15-amp. breaker should be used for overload and cable protection, thus avoiding tripping the large unit. The problem of mounting space, however, is hard to solve unless space is provided on the mining machine.

A slightly different d.c. breaker system recently went into service at two western operations. These mines use shuttle cars and crawler loaders. Since cutting, drilling and loading takes place simultaneously, separate 200-amp. breaker cabinets (Fig. 2) are installed in fresh air near the working places to handle one loader or a mining machine. A 15-amp. breaker is included to protect a drill motor circuit, which may be plugged into any cabinet. A 200-amp. incoming-line male plug brings power into the cabinet from a female receptacle attached to a No. 2 200-amp. cable with ground wire. The 200-amp. plug on the mining machine or loader connects to the outgoing cable. Screw-type rings prevent accidental pulling out of plugs. A ground-trip relay on the large breaker cuts power off the

entire cabinet, much as in Fig. 1, when a drill or large machine becomes grounded.

A.C. Grounding

The protective grounding equipment for a 440-volt three-phase a.c. system is shown in Fig. 3. It is somewhat more complicated because a good ground is more difficult to obtain.

The general layout is similar to the d.c. arrangement for room-and-pillar work. A.c. power usually is brought into the mine at 2,400 volts to a bank of delta-connected transformers, which step the voltage down to 480. A circuit breaker or fused switch protects the cables to the various entries. This breaker must have adequate capacity to interrupt the maximum current that can flow on a short circuit, which will vary from 15 to 20 times the full-load current rating of the transformer bank.

A three-pole 225-amp. air circuit breaker with the proper-sized overload trip coils to fit the motors, and an additional ground-tripping relay, or series coil, with a rating of only 2 amp., is installed in fresh air at the room neck. A three-conductor Type G cable with ground wires then connects to the mining machine with the conventional four-conductor plugs and receptacles if desired. The ground wire in turn connects from the mining machine to the ground-trip coil in the breaker and then to a water pipe or rail. All other machines in the working place connect to the circuit breaker in like manner through their respective motor starters. Thus far, therefore, the a.c. system is similar to the d.c. previously described, except that three power wires are required.

The next question, however, is obtaining a safe and adequate ground. It is simple with d.c. because the grounded track is used for the negative return to the generator. This is not true with three-phase delta transformers because extreme care always is exercised to insulate all three wires from any ground. How, then, can current be drained off a motor frame if the insulation fails? It was pointed out earlier in this discussion that current could not merely be pumped into the ground without flowing back to the transformers to complete the circuit. The real objective is finding a neutral point in the center of the delta triangle of the 480-volt transformer secondary windings that does not use power.

There are several ways of accomplishing this. One of the best is to use three 440-volt 1-kva. grounding transformers whose primary windings are Y-connected as shown. The three ends of the Y connect to the three 440-volt wires from the circuit breaker, and the midpoint of the Y becomes a neutral balanced point at zero voltage with respect to the 440-volt system. The midpoint, therefore, can be connected to a ground, such as a rail system if available, a water pipe or some other low-resistance ground. The grounding transformer draws no current from the 440-volt system beyond that needed to magnetize the iron. It will be noted that the 110-volt secondaries of these transformers are connected in closed-delta, with no external load connected to it. The function of this arrangement is to help provide sufficient current in the ground wire to trip the breaker in case of insulation failure in the cable or motor.

A further important function of the grounding transformer is limiting the voltage between any of the power wires and any machine frame or ground to only 253 volts.

Now, if a line wire becomes grounded on the motor frame, it immediately tends to short circuit one leg of the grounding transformer. The transformer sends its maximum current along that wire to the frame, back along the ground wire through the 2-amp. series ground-trip relay and back to the midpoint of the transformer and the ground. The ground relay immediately trips the breaker in a fraction of a second and cuts all power off the motor. During this interval, absolutely no power current is taken from the 440-volt supply and the grounding transformer does all the work. A ground on any of the other two phases accomplishes the same results.

Frame Voltage Limited

Tests on these transformers have shown that only 90 amp. flowed when a power wire was directly grounded to the frame with zero resistance. Assuming that the ground wire has a resistance of half an ohm or less, this means that the maximum voltage rise of the motor frame above ground is only 45 volts. If the insulation resistance between frame and a phase wire is as much as 100 ohms, the ground-wire current is only about 2 amp., which will still trip the breaker while at the same time

keeping the motor frame at 1 volt above ground. Intermediate resistances in the motor result in higher currents between 2 and 90 amp., which are more than ample to trip the breaker while keeping the voltage on the frame at less than 45.

The grounding system shown in Fig. 4 was tested recently at a Middle-Western strip mine. It is essentially the same as the system shown in Fig. 3, except that it uses a three-phase grounding autotransformer connected in a zig-zag arrangement.

The transformer is capable of producing a very high current when a fault occurs. Consequently, a 50-ohm resistor must be installed between the ground and neutral as shown to limit the current to 5 amp. Test results were excellent, the voltage on motor frames never exceeding 2½ volts above ground. The total cost may be slightly less than when using Y-delta grounding transformers.

Cost of Grounding

It is rather difficult to give exact figures on the cost of a grounding system, since it depends upon a number of factors which vary in different mines. They include:

1. Mining system employed and the sizes and arrangement of mining machines. This determines the type and size of breakers.

2. Type of power, whether a.c. or d.c.; voltage and kilowatt rating of the power supply. Breakers must be selected that will interrupt the maximum short-circuit current produced by the transformer or conversion set.

3. Type of protection desired—single circuit breaker for all machines in one working place or several breakers for selective tripping of circuits.

4. Circuit-breaker location—in fresh air or near the face. This will determine if permissible or standard inclosed circuit breakers and plugs can be used.

5. Type of installation—factory assembled portable circuit-breaker unit with plugs and receptacles, or a unit built to fit mine conditions. If the mine already uses a portable frame to supply power to a working place through several fused knife switches and an assembly of magnetic starters and drum controllers, it would be feasible to substitute an inclosed circuit breaker with ground-trip relay for the fused switches.

6. Size and length of trailing

cables with ground wires required; also plug and receptacle requirements.

An experimental unit made up for a western coal company using the room-and-pillar system is shown in Fig. 5. The main circuit breaker (1) is a three-pole 225-amp. unit with an interrupting rating of 15,000 amp., and includes a ground-trip relay. It supplies current to the mining machine through a four-conductor plug (6), mounted in the breaker case. The three grounding transformers (3) are located as shown and connect to the terminals of the breaker. A conventional magnetic switch (2) with temperature-overload protection and with push-button (5) is used to start the conveyor through plug (7) to the cable. A small 15-amp. three-pole air circuit breaker (4) provides short-circuit protection for the small blower fan and prevents unnecessary tripping of the large breaker.

The small relay (8) and lights are added to show when the breaker has tripped as a result of a cable or motor ground. They do not light under ordinary overload conditions and the fact that they are burning is a signal to start hunting for trouble.

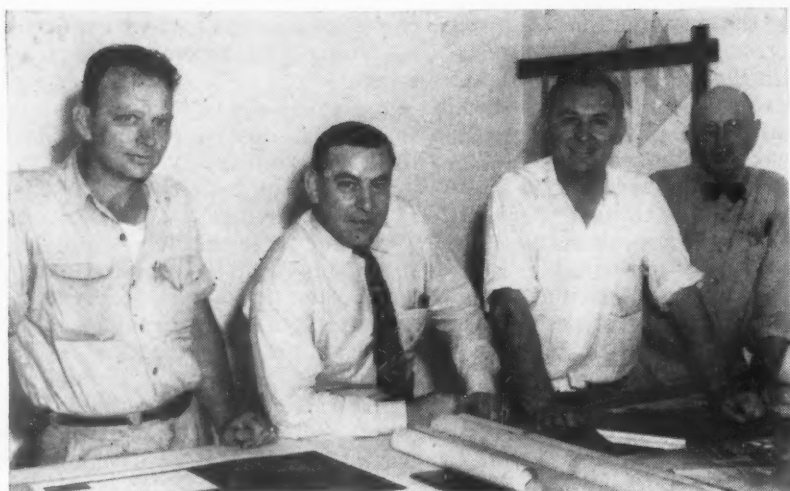
A similar unit could be used in a d.c. system with a two-pole breaker. Some mines use a drum controller and a resistor for a conveyor and these can be mounted on the same portable frame.

Cost Not Excessive

The approximate cost of one of these heavy-duty three-pole breakers with the ground-trip relay, in a dustproof case, is \$175. The three 1-kva. grounding transformers are about \$80. This makes the cost of the minimum essential equipment for grounding only \$255 for one working place. Of course, the plugs, receptacles and Type G cable also must be considered, as well as labor for mounting.

For d.c., a similar two-pole 225-amp. breaker with ground-trip coil is about \$150 and, of course, no grounding transformers are necessary. If factory-assembled or complete Type BM permissible equipment is preferred or required, the cost varies accordingly.

The basic idea of grounding mining machinery is sound. It will save the lives of men and make them feel safer, which should lead to better work. Coal production should increase because there will be fewer interruptions, and maintenance costs should be reduced.



F. W. Turner (left), assistant to H. B. Turner; T. C. Jennings, Joy Mfg. Co.; Fred Depue, vice president, operations, Kimberling Collieries Co., and H. B. Turner, consulting engineer, in Mr. Turner's office, Gilbert, W. Va.



W. S. Robertson (left), safety inspector, and J. B. McCorkle, chief engineer, Hutchinson Coal Co., Hutchinson, W. Va.

COAL MEN ON THE JOB



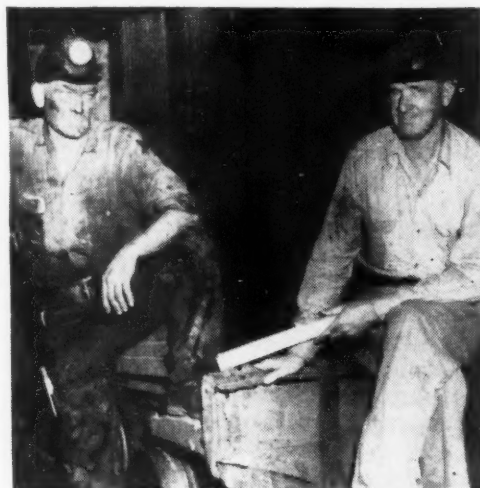
K. W. Stafford (left), superintendent, and Lewis Curry, tipple foreman, Elk Creek Mines Nos. 1 & 2, Elk Creek Coal Co., Emmett, W. Va., and D. C. Wilson, contract trucker for the company.



Norman Jones (left), section foreman, Otto Norris, section foreman, and Woodrow Wilson, section foreman, Praco mine, Alabama By-Products Corp., Praco, Ala.



G. C. Dewey (left), mining engineer, Dick Hammock, assistant engineer, James Kennett, assistant secretary, C. A. Kelly, superintendent, D. Brown, exploration driller, and Luke Shoulders, tipple foreman, Colonial Mining Co., Madisonville, Ky.



T. J. Faught (left), chief electrician, and S. W. Jackson, superintendent, Calumet mine, Brilliant Coal Co., Parrish, Ala.

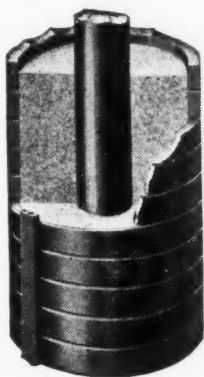
Exide IRONCLAD BATTERIES

HAVE ALL FOUR VITAL CHARACTERISTICS
FOR SAFE, DEPENDABLE MINE HAULAGE SERVICE

1. **HIGH POWER ABILITY** . . . abundant reserve power plus an ability to discharge at high rates.
2. **HIGH ELECTRICAL EFFICIENCY** . . . hence low power costs.
3. **RUGGEDNESS** . . . to withstand hard usage.
4. **LONG LIFE and MINIMUM MAINTENANCE** . . . which add up to better service at a saving.

Because of these outstanding qualities, Exide-Ironclad Batteries are used by more mine operators than all other batteries combined.

Most batteries look much alike on the surface. But inside are the differences that determine power, performance and battery life. One notable difference in Exide-Ironclad construction is the positive plate.



THE POSITIVE PLATE

consists of a series of slotted tubes which contain the active material (see small illustration at left). So fine are these slots that, while permitting easy access of electrolyte, they retard active material from readily washing out . . . thus assuring years of safe, dependable, day in and day out mine haulage service.

1888—Dependable Batteries for 60 Years—1948

If you have a special battery problem, or wish more detailed information, write:

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32

Exide Batteries of Canada, Limited, Toronto





The Foremen's Forum

How You Can Help Your Men Move Up to Bigger Jobs

WHEN you get your next promotion, who is going to step into the place you leave? And who is going to move up to take over from the man who steps up to your old job?

These are pretty important questions for you as well as for your company. To stay in business and keep on mining coal efficiently, your company has to have men down the line who can move to the next step up the ladder when somebody at the top retires or goes somewhere else to work. For your own part, when you take on a bigger job, moving up from section foreman to mine foreman or from mine foreman to superintendent, you need men under you who can hold down your old jobs as well as you did when you earned your promotions. If, in your higher position, you don't leave good men behind you to back you up, you are not going to look so good yourself and your own part of the organization is going to slow down or even break down, carrying you with it and perhaps even the company as well.

That's why it is important for a company man, from face boss right on up to general manager, to spot the good men on the rungs of the ladder below him, pass along to them his own experience and guidance and thus get them ready for opportunity's next knock.

Spotting the good men, however, must be done pretty carefully. In fairness to all—yourself, your company and your men—it must not be done in a slipshod manner and must not be geared to your personal likes and dislikes. The only sound way to keep your men sized up is to keep a record—a written record—that shows how your men measure up. Such a record might look something like the accompanying chart, which is simple but clear and fair. If you are a foreman and keep a chart like this for every man on your crew, or if you are a superintendent and keep similar charts for all your foremen, you can tell without much trouble who is the best man to recommend as your successor when your big opportunity comes along. You should be careful, however, to review and revise these records periodically—once every two weeks or once a month—to keep them

up to date and to spot any improvement or backsliding. You can pretty well bet that the man with a poor record showing improvement is a better bet than the man who starts with a bang and then fizzles out. In addition to helping you spot the best men you have, records like these help you along in talking things over with your men. With the record in front of you, you can commend a man or point out his weaknesses, as the case may be, and you can show him that you are on your toes and mean business.

But records are only a tool for spotting your good men. Once they are spotted, what can you do to help them become better men and equip them to take over when you move up? Here are a few suggestions:

1. Suggest ways by which they can help themselves. Along these lines, there are night classes and extension courses offered by state universities and state mining departments, special classes in some districts conducted by local high schools and off-hours classes made available by the company itself and staffed by experts in various fields. Also, there are a good many books especially written for self-help in mathematics, mechanics and electricity, to mention only a few subjects, as well as helpful magazines about coal mining. If you have helped yourself to promotion in these ways,

you are in a good position to show the men below you how they can help themselves.

2. Give your men chances to take responsibility outside their usual routine. You will never know how a man performs under pressure until he has had a chance to work under pressure. Also, there's this to remember: some men grow to the size of their responsibilities; that is, they don't show their ability until they are put to the test. The only way their supervisor can spot them is by giving them a chance to show how much they have got on the ball and whether they can grow to the size of a bigger job. When you delegate responsibility, check up on the man you made responsible. If he did a good job, commend him and give him wider scope. If he flubbed the job, show him how he fell short and, if he deserves it, give him another chance.

3. Keep your group meetings from becoming one-man shows, with yourself as the star performer. Encourage your men to speak up and express their ideas and thus give them a chance to uncover and exercise their talents. The ability to think on his feet and express his ideas effectively is a skill all supervisors need but it can be developed only by practice.

4. Pass along information about your company—where it stands, what its future is and what its problems are. Tell your men also how the top men got to the top. Since you are a cut or two above the men who work for you, you have sources of information that they don't have. Show them the ropes. When they move up a notch, they'll need a lot of know-

Personal Record

Name
Classification
Period from to

	Never	Seldom	Average	Always
1. Workmanship first class?	_____	_____	_____	_____
2. Careful about details?	_____	_____	_____	_____
3. Keeps the work moving?	_____	_____	_____	_____
4. Job well organized?	_____	_____	_____	_____
5. Disregards unnecessary details?	_____	_____	_____	_____
6. Grasps instructions quickly?	_____	_____	_____	_____
7. Willing to take on extra work?	_____	_____	_____	_____
8. Keeps confidences?	_____	_____	_____	_____
9. Gets through on schedule?	_____	_____	_____	_____
10. Is safety-conscious?	_____	_____	_____	_____
11. Makes worthwhile suggestions?	_____	_____	_____	_____
12. Gets along with fellow workers?	_____	_____	_____	_____

MINE LUBRICANTS

MARATHON

V.E.P. OIL



Different! Proved for 11 years!

MARATHON V.E.P. OIL MAKES ENGINES LAST 50% LONGER

than they would with ordinary oil*

There's no other oil like V.E.P. It's patented! It's the pioneer, heavy-duty additive oil! Put it in any engine, gasoline or Diesel, and you'll get 50% more work between overhauls. Even more important, Marathon V.E.P. makes engines last 50% longer than they would with ordinary oil, *as proved in scientific tests and 11 years of job performance.

Marathon V.E.P. gives you everything you expect of the finest heavy-duty oil...plus these outstanding advantages:

- V.E.P.'s "Magnetic-like" film clings to vital engine parts, prevents damaging "dry" starts. "Stays put" at high temperatures. Protects bearings against corrosion.

- V.E.P.'s constant cleaning action keeps engines clean...valves and rings free...oil holes and lines open. Saves wear, saves fuel. Conserves power.

- V.E.P.'s triple-plus film strength gives more than 3 times as much protection as ordinary oil against heat, pressure, shock.

A COMPLETE LINE OF MARATHON LUBRICANTS FOR
EVERY OPERATION IN YOUR STRIP OR SHAFT MINE



THE OHIO OIL COMPANY

Producers of Petroleum since 1887

GENERAL OFFICES: FINDLAY, OHIO • District Offices: Robinson, Ill., Indianapolis, Ind., Louisville, Ky.

how that you can give them while they are still on the lower rungs of the ladder.

5. Work along with the "eager beaver" but keep him well in hand. It's pretty easy to lose patience with the man who is always popping off with ideas and flying off in all directions at once. A smart supervisor, however, knows that the faults of the "eager beaver" are on the positive side. He is genuinely interested in making his job better and getting along and if he is too much a busy-body, it is probably because his present job doesn't give wide enough scope to his talents and energy. "Eager beavers," if reasoned with, calmed down and controlled without being smothered, can be developed into good supervisory prospects. After all, enthusiasm is a virtue in coal mining as well as in other industries and the man who shows it is likely to have some of the other merits that qualify him to become a supervisor.

6. Set such an example in your personal conduct and the discharge of your responsibilities that your men respect you, give their loyalty to you and strive to imitate you. Not all workers are willing to believe that the next job above them is desirable. It's your job to show them in every way possible that it is desirable, thus urging them to seek their own promotion and prepare themselves for bigger jobs.

If you do these things to help your men get ready to move up when the time comes, you'll do a good turn for yourself as well as your company, as pointed out earlier. But if you're afraid somebody will take your job away from you and therefore don't ready your men for their promotion, you probably haven't any business being a supervisor anyway. The idea is this: Keep yourself so well prepared for the next job ahead that you can't move any way but upward when changes occur and, at the same time, keep your eye on the men who work for you and who will take over your old responsibilities when you move up.

How to Improve Haulage Practices

By J. J. PLASKY
Training and Safety Director
Red Jacket Coal Corp.

A study of the causes of haulage accidents indicates that most of them are preventable. To bring the haulage-accident rate down, here are a few things we can avoid:

1. **Excessive speed**—The speed at which an automobile is driven safely is determined by several factors, such as the condition of the automobile, the straightness, width and condition of the road and the weather conditions. Likewise, the safe speed for operating haulage equipment in a

mine depends on the condition of the locomotive and the cars and the condition of the haulageway, particularly as to curves, grades and alignment. Many serious haulage accidents have occurred from excessive speed where conditions did not permit it.

2. **Loss of control**—Keeping trips under control is very important. Several factors may contribute to the loss of control of the trip, such as bad condition of the brakes, insufficient skids, insufficient sand or failure to keep the sand rigging in operating condition. When a trip is getting out of control, the haulage crew may become panicky and may be forced to decide whether to jump from the locomotive or stick with it. Their decision either way may result in injury or death. It is far better to do all that is necessary to keep control of the trip and thus avoid having to make such a decision.

3. **Pushing trips**—When trips are pushed, a motorman's vision is restricted and derailment may cause great damage, often dislodging timbers and allowing the roof to fall before he is aware of it. Trips are often derailed at switch points or frogs, injuring couplers or brakemen. Derailements also may cause ignition of coal dust or may cause a mine fire by the arc from a dislodged short-circuited trolley wire.

It sometimes is necessary to push trips because the haulage layout does not provide enough "runaround." However, pushing trips should be eliminated insofar as possible. Trips of cars that are pulled can be handled easier and more safely because of better control and visibility.

4. **Jumping on or off moving locomotives or trip**—In some instances, the brakeman jumps off and runs ahead to throw a switch or open a door, and several cases have been reported where the motorman got out of the deck to throw a switch and allowed the locomotive to travel uncontrolled under power, then got on again as the locomotive passed the switch. These practices are hazardous and should be prohibited. Installing automatic switches and doors, stationing trappers or requiring the trip to come to a full stop before the brakeman dismounts would minimize the chances of an accident from these causes.

5. **Flying switches**—The practice of the motorman's uncoupling and speeding up the motor to allow the cars to run onto another track is unsafe and is a violation of most company safety rules as well as those of other agencies. A locomotive "runaround" will permit the motorman to pull the trip onto a side track with comparative safety.

These are only a few of the several outstandingly bad haulage practices that have caused injury or death. To make the record better, management should remove all physical hazards

within its power, supervisory officials should not pass up violations of safety rules because of temporary conditions and the workers should not take chances which they know, or should know, are hazardous. Then we can expect fewer accidents.

—The Red Jacketeer

Stopping Unsafe Acts

It has been conservatively estimated that about four-fifths of all occupational injuries involve unsafe acts. Some raise this figure to as high as 9/10ths but without splitting hairs it will be generally agreed that the overwhelming majority of occupational injuries are from human as well as mechanical faults.

In the operation of bituminous coal mines, most of the injuries to persons occur from their own unsafe acts but many result from fellow workmen's unsafe actions. It is not enough to be satisfied with such analysis, because the first performance of an unsafe act does not always result in injury. Such acts are usually known or should be known to the direct supervisors or to top management but have been tolerated or "winked at" for the sake of expediency. After the known unsafe act results in injury, often much surprise is manifested by the officials and the easy "out" is to place the full responsibility upon the victim or his fellow workman.

Your editor does not imply that the workman has no responsibility for his unsafe acts. On the contrary, the workman is most vitally concerned because it is he who usually suffers most from them. A primary function of mine officials is to discover unsafe acts and conditions before they result in injury. Isn't that the reason why most state mining laws and other safety rules and regulations require daily visits to working places and certain weekly examinations of a mine?

A few years ago, a mine fire disastrous in loss of both life and property resulted from a workman's pulling down loose rock over an energized trolley wire. The trolley wire was dislodged and held on a rail by the fall of rock and the resultant arcing set fire to the coal. A mine fire resulted with the loss of 66 lives. Perhaps if the workman had done certain things the fire could have been extinguished before it gained headway, but fundamentally the unsafe act was pulling loose roof down on a charged trolley wire. The opinion is ventured that in this particular mine this was not the first time that loose roof had been pulled down in the vicinity of a charged trolley wire, but that such action had been common practice and was tolerated by the official family.

Successful officials and supervisors must be endowed with the quality of FORESIGHT and must use it to eliminate the unsafe acts of workmen.

—Coal Mining Section,
National Safety Council

For *STEPPED-UP* TONNAGE

NEW 30-TON MACK

● Mack's new Model LRSW packs a 30-ton payload in its monster dump body — or pulls 55 tons as a tractor semi-trailer.

Big 275 h.p. super-charged Diesel keeps tonnage moving away from the shovels — fast. Massive frame is of alloy steel, reinforced and welded into one piece; built to stand up under the stiffest punishment. Mack's famed Balanced Bogie with exclusive Power Divider assures positive traction over difficult terrain and through slippery mud. Power steering and air-assist clutch mean easy handling, less driver fatigue, better maneuverability, safe and sure control. Roomy, all-steel cab has offset driver's seat for better vision.

No other off-highway truck offers you so many outstanding features and advantages. No other manufacturer but Mack designs and builds so many of its components in its own factories — your assurance of trucks that are perfectly co-ordinated for utmost efficiency.

Let us give you full information in terms of your particular operation. Write or call your nearest Mack branch or dealer.

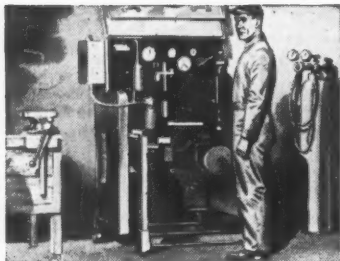


Here's the famous Mack Balanced Bogie with the exclusive Power Divider which brings new standards of performance to off-highway hauling. Unusual flexibility and balance insure even tire loading, uniform braking and equal traction on all four wheels. Maintenance is reduced to a minimum because of functional design.

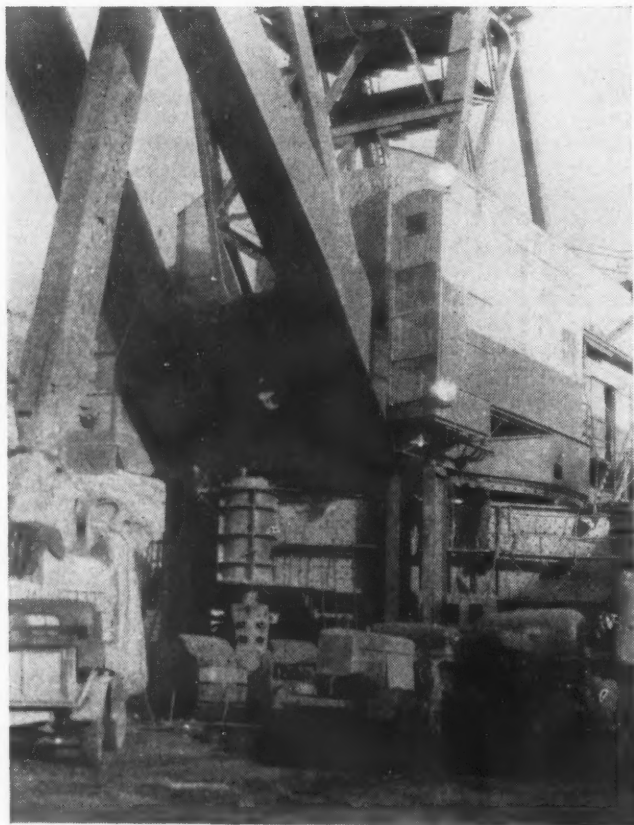
Mack

TRUCKS FOR EVERY PURPOSE

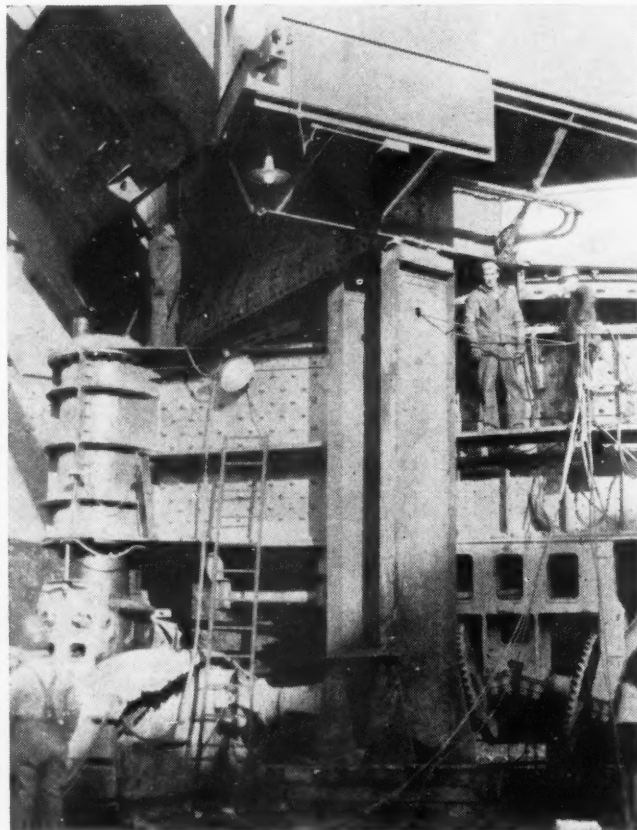
Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.



Operating Ideas



ELEVEN FABRICATED plate-and-angle columns support the upper deck of the shovel during the two-stage operation of replacing the top and bottom circle rails.



WITH THE DIPPER resting on the ground, four columns, two on each corner, support the front end of the shovel's upper deck. Each column will support a 200-ton load.

Shovel's Circle Rails Changed in Three Days

TOP AND BOTTOM circle rails on a Type 5561 40-cu. yd. Marion shovel are changed in three days by using special structural-steel columns to support the upper or moving deck at the Georgetown No. 12 mine, Hanna Coal Co., St. Clairsville, Ohio.

The new method of changing the rails and the manner in which the structural columns are used are shown in the accompanying illustration. The idea, which converted a 12-day job into one taking only three days, was the work of Messrs. Bert Simonson, Leo Inskeep, Bruce Myers and Don Kleckner.

Under the old method, replacing only the upper circle rail required three crews, working around the clock, six days. The procedure was to first loosen, but not remove, the center pin to provide working space between the decks. Then, using the

dipper stick and the dipper as a jack, one corner of the upper deck was raised and safety blocked. By dismantling the circle-roller frame, a section of the circle rail was unclamped and removed by sliding the rail over the rollers to where the greatest clearance was available. Five complete setups had to be made to remove and replace the entire circle rail. This method tended to overstress the center pin, and the clearance at the circle rail was limited by the fit of the center casting and pin.

Under the new and faster method, eleven 12x29-in. structural steel columns are used to support the corners of the upper deck at the same elevation. Each column was fabricated by riveting 6x6x $\frac{1}{2}$ -in. angles to a $\frac{1}{2}$ -in. center plate, forming a simple plate-and-angle column. A 36x36x $\frac{1}{4}$ -in. steel base plate was welded at the

bottom of each column with four 36-in.-high gusset plates bracing the column to each corner of the base plate. Each column is designed for a load of 400,000 lb. (200 tons); thus the eleven columns, collectively, could support 2,200 tons.

The latest procedure requires turning the upper deck of the shovel approximately 45 deg. with the lower deck to have all corners protruding beyond the edges of the lower deck. Then, the machine is raised with its hydraulic equalizing jacks to facilitate the placing of the structural steel columns. The columns are set on 6x10-ft. mats built from 8x8-in. oak timbers, top-bolted with 8x8-in. by 6-ft.-long timbers. The columns, after being placed on wooden mats, are leveled, plumbed vertically, and lattice braced. The eleven columns are placed under the protruding cor-

FOR LONGER GEAR LIFE...

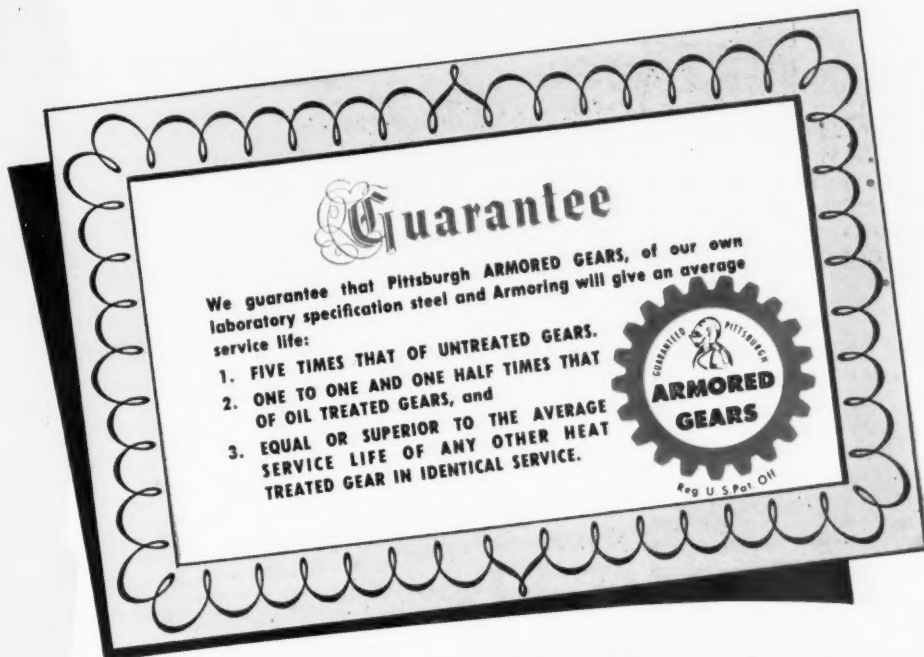
**JUST THE RIGHT
HARDNESS
IN JUST THE RIGHT
PLACES!**



That's what does it . . . the RIGHT hardness in the RIGHT places, plus a tough, shock-resistant core! It's the secret behind Guaranteed Pittsburgh ARMORED GEARS greater resistance to shock, wear and breakage (See the Guarantee). Too, it's the secret of mines everywhere to their lower maintenance costs and increased production resulting from their fewer work stoppages for repairs and replacements.

You too should standardize on Guaranteed Pittsburgh ARMORED GEARS and Parts for your replacements and save. Prompt deliveries assured, usually from stock. See the Pittsburgh Gear Distributor near you.

Switch to GUARANTEED PITTSBURGH ARMORED GEARS

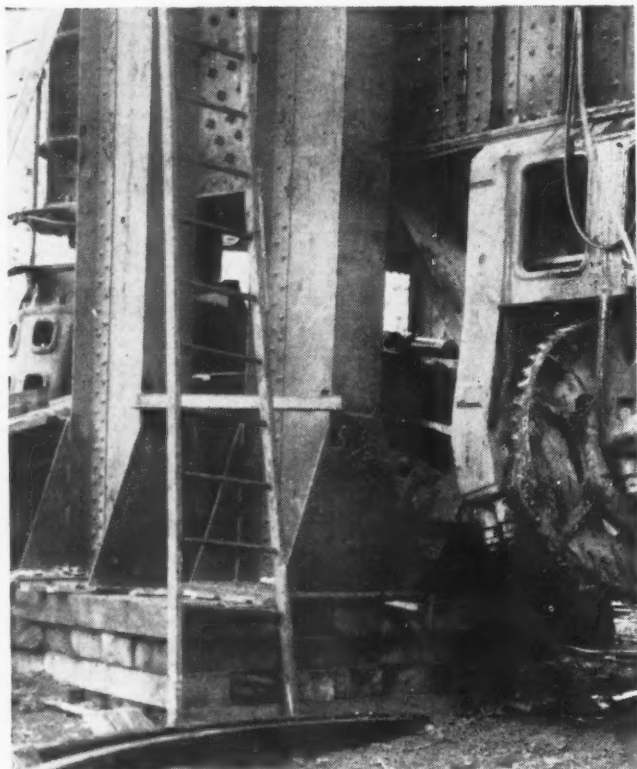


**SEE THE PITTSBURGH GEAR
DISTRIBUTOR NEAR YOU!**

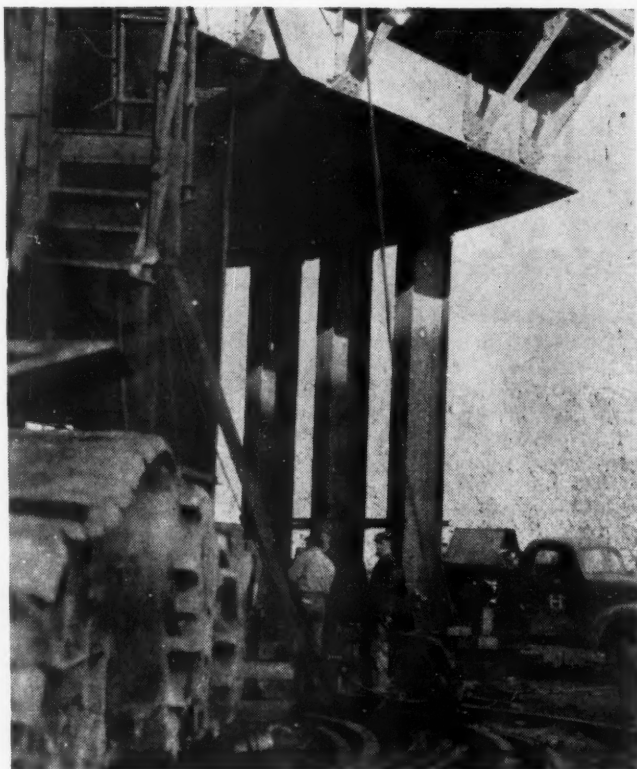


**PITTSBURGH GEAR
COMPANY** | 27th & Smallman Streets
PITTSBURGH 22, PA.

GEARS AND PARTS FOR LOADERS, CUTTERS, LOCOMOTIVES



THIS FOUR-LAYER wooden foundation mat helps to distribute the bearing load of this two-column support.



THESE TWO COLUMN stations include a side station (two columns) and a rear station consisting of a three-column group.

ners of the upper deck as follows: (1) two under each front corner, right and left, underneath the operators' cabs; (2) two on each side, immediately behind the rail roller frame; and (3) the remaining three under the shovel motor-generator sets and ballast boxes.

Next, the center-pin nut is loosened and the upper frame lowered until the upper deck rests on the eleven columns. Using the hydraulic equalizing jacks, the bottom frame is lowered approximately $7\frac{1}{2}$ in. to provide working space between the upper and lower decks. Thus the separation of the decks provides sufficient clearance to remove and replace the upper circle rail on the revolving frame in one setting.

Before the lower circle rail can be replaced the roller frame must be raised out of the way. This is accomplished by raising the lower frame with the hydraulic equalizing jacks until the rollers bear against the newly-installed upper rail. In this position the roller frame is made fast to the upper deck by tack-welding support bars at intervals of 6 ft. Then the hydraulic jacks are released and the lower frame dropped to provide a clearance of 7 in. This permits changing the lower circle rail in much the same fashion as the upper.

After replacing the bottom circle rail, the lower frame is raised with the hydraulic jacks and the center pin tightened and the columns removed. It should be noted that during this entire operation no bending loads are imposed on the center pin, and the



HOW THE FEET of the three columns supporting the back end of the deck are lattice braced. These three columns together are designed to support 600 tons.

clearance is not enough to take the swing-motor pinions and circle gears out of mesh.

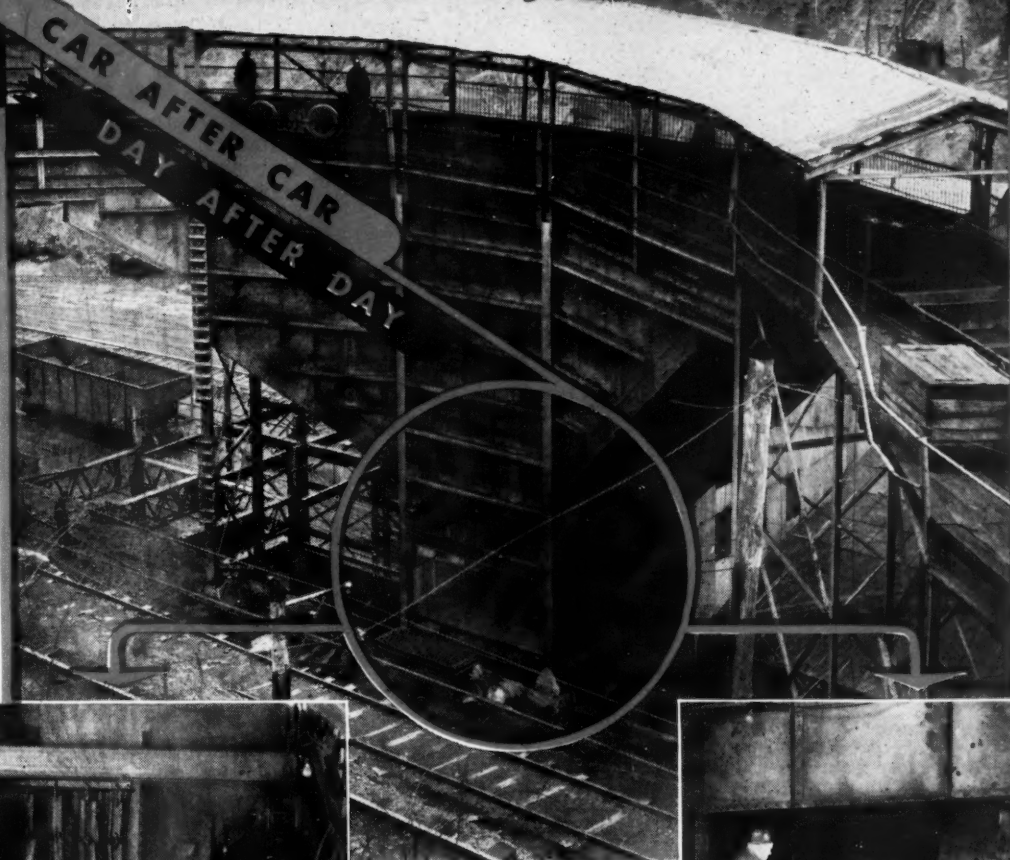
Using the old method, it took three crews six days to change only the

top circle rail. With the column-support method, three crews can replace both the upper and lower circle rails in three days, thus accomplishing twice the work in half the time.

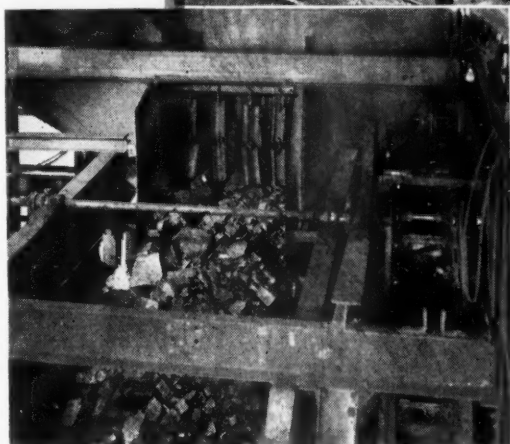
500 TONS

per hour

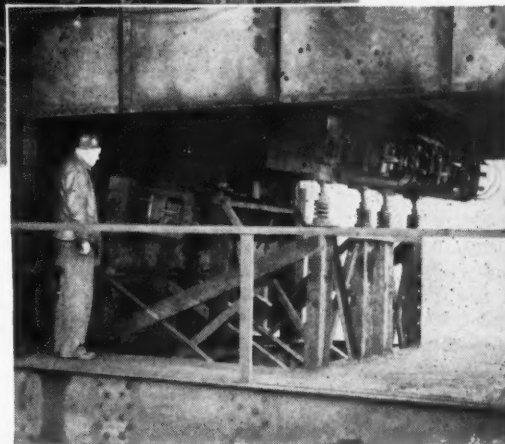
CAR AFTER CAR
DAY AFTER DAY



(Patented)



Left—front view of the Jeffrey-Traylor electric vibrating Feeder feeding R. O. M. coal at 500 tons per hour. Right—rear view of the same feeder.



Large illustration is a general view of bin showing continuous dumping of mine cars over a 5' x 10' Jeffrey-Traylor electric vibrating Feeder . . thence to shaking screen.

THE JEFFREY

MANUFACTURING COMPANY

ESTABLISHED 1877

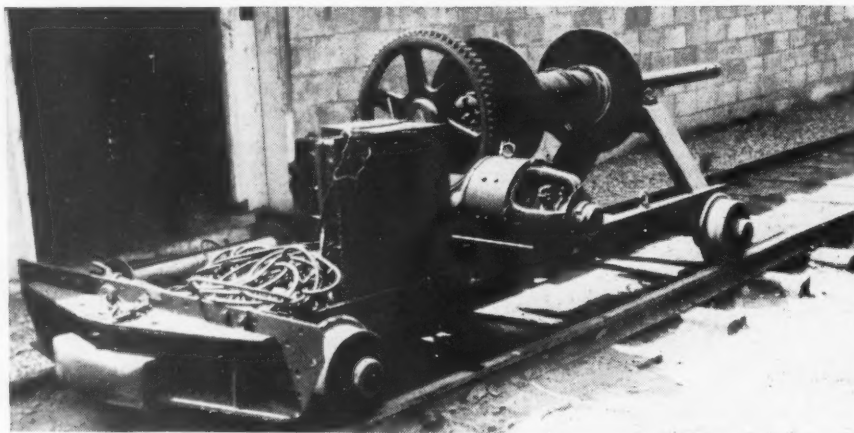
912-99 North Fourth St., Columbus 16, Ohio

Baltimore 1	Buffalo 2	Cleveland 13	Harlan	Jacksonville	Pittsburgh 22
Birmingham 3	Chicago 1	Denver 2	Houston 5	Milwaukee 11	St. Louis 3
Boston 16	Cincinnati 2	Detroit 13	Huntington 19	New York 7	Salt Lake City 1
				Philadelphia 3	Scranton 3

Complete Line of
Material Handling,
Processing and
Mining Equipment



Belt Winder Facilitates Conveyor Moves



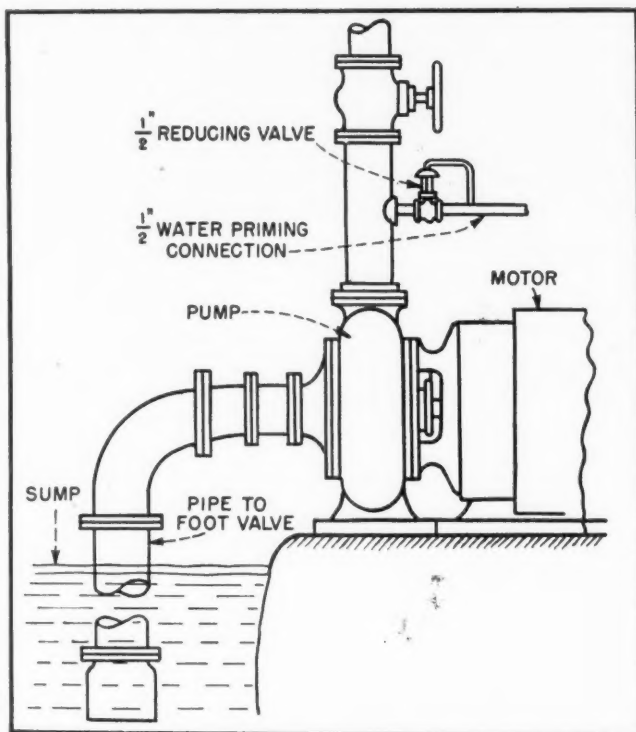
THIS CONVEYOR-BELT WINDER includes a winch for miscellaneous pulling jobs.

TO EASE the problem of handling belt sections in moving underground conveyors, the combination winder and winch shown in the accompanying illustration has been developed at the Gorgas mines of the Alabama Power Co., Gorgas, Ala. The winch part, however, was built into the unit shown because there was a need for it then. Normally, it would be omitted.

In dismantling and pulling out a belt conveyor, the winder is set on the track at the belt head and a special sleeve, to which the regular belt fasteners can be hooked, is slipped over the shaft. The motor then is started to wind up a 300-ft. section of the belt, which is carried on the unit either to the next set-up or to storage.

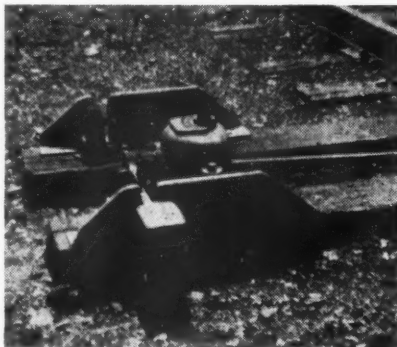
Automatic Pump Equipped For Self-Priming

THIS SINGLE-STAGE centrifugal pump was installed on the lowest level in a gold-silver mine in central Mexico to pump water collecting periodically in the shaft sump to the central pump station two levels above, according to *Engineering & Mining Journal*. Operation is automatic, starting and stopping of the pump being controlled by a float switch installed in the sump. Water handled by the pump at many periods is muddy, and as a consequence a slimy deposit is built up inside the foot valve, keeping it from seating drop-tight after a pump shutdown. The leak through the foot valve causes a loss of prime. To avoid this and insure proper starting of the pump, the mine mechanic installed the reducing valve in the discharge pipe of the pump. The reducing valve in the $\frac{1}{2}$ -in. fresh water line is set to let water flow into the pump if discharge pressure drops below the static discharge head on the pump, replacing the water lost by leakage through the foot valve. When the pump is in operation the pressure in the discharge line is above the reducing-valve setting, and the valve remains closed. During shutdowns, the amount of fresh water flowing through the reducing valve is $1\frac{1}{2}$ g.p.h.



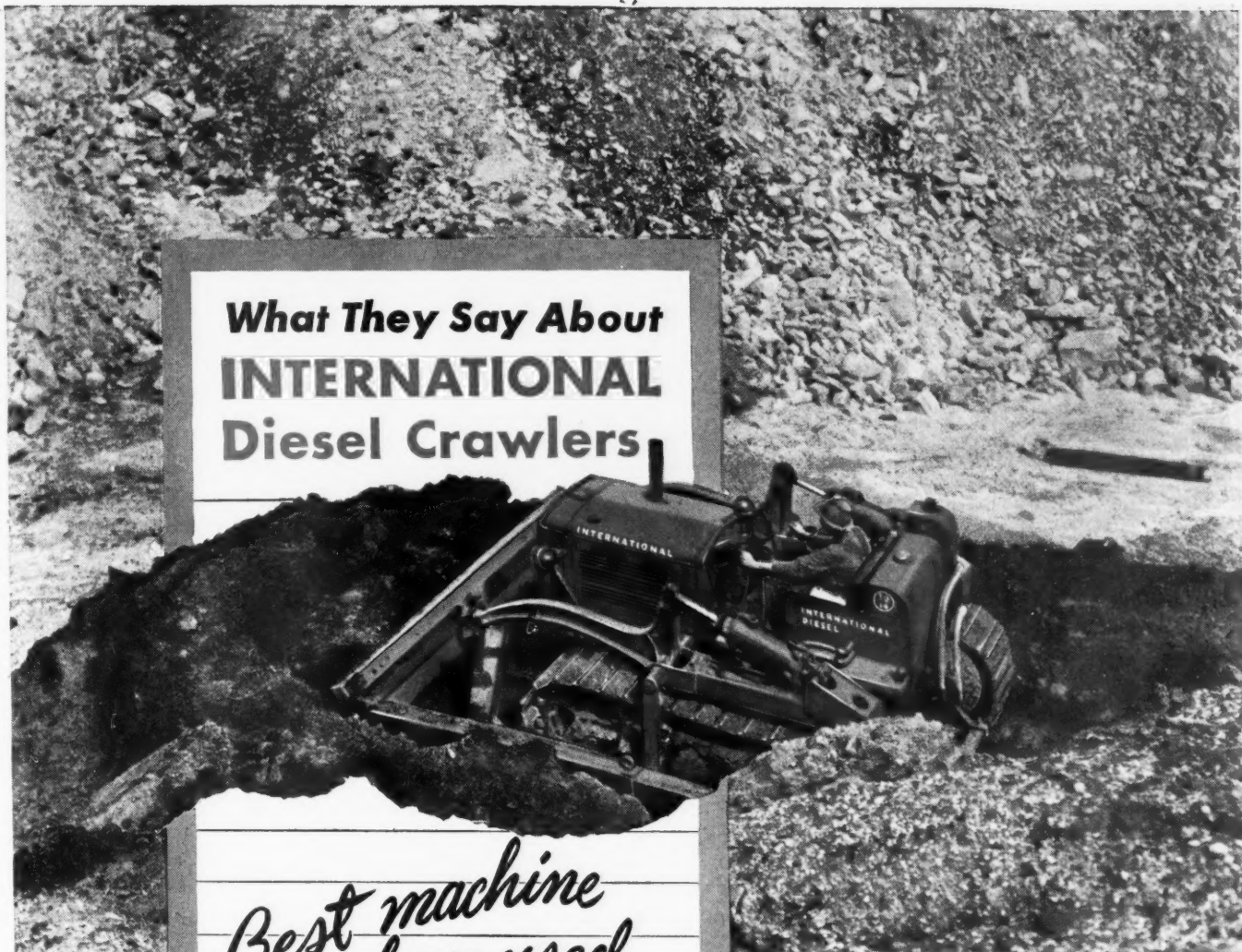
Shields on Switch Throws Minimize Rope Accidents

THE ADDITION of shields on switch throws at the Dorrance colliery, West Virginia Coal & Coke Corp., Stirrat, W. Va., as shown in the accompanying illustration, has provided protection against the hoist rope becoming fouled in the throw. The primary purpose of the installation was to eliminate the danger of possible injury to workmen from a taut rope being suddenly released from a fouled position. The guards are painted yellow, to call attention to them and indicate the need for caution.



Credit for Your Ideas?

Although you may have used some of these "Operating Ideas" to an advantage, are you using this department to gain full credit and recognition for your own ideas? Send us any worthwhile mechanical, electrical, operating or safety idea that has worked for you. There's cash in it for you too. If published, Coal Age will pay you \$5 or more for each.



What They Say About INTERNATIONAL Diesel Crawlers

*Best machine
I have used
to date.*

The International TD-14 Diesel Crawler with bull-grader shown above served Penbrook Drayage & Supply Co., Harrisburg, Pa., in coal stripping operations. "Best machine I have used to date," says its owner!

The endorsement of operators and owners of International Diesel Crawlers in the mining industry is the best answer to any question you may ask about the usefulness and economical operation of these mighty tractors.

In the many jobs they do so well: building and maintaining access roads, stripping overburden, moving spoil banks, feeding shovels and cleaning up; they are without equal.

The whole story of their superiority describes their many valuable features. They are sturdily built for rough and tough service. Advanced design fuel injection assures highly effective use of fuel. An all-weather starting system elimi-

nates time-wasting starts. Tocco hardened crankshafts and other vital parts, and replaceable cylinder liners that are file hard, assure long wearing life. Full-pressure lubrication and efficient cooling systems make sure of dependable engine performance.

For complete specifications and other information about these tractors, International Diesel engines and matched equipment, consult your International Industrial Power Distributor. Let him assist in selecting tractors and equipment for your use.



Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
180 N. Michigan Avenue • Chicago 1, Illinois

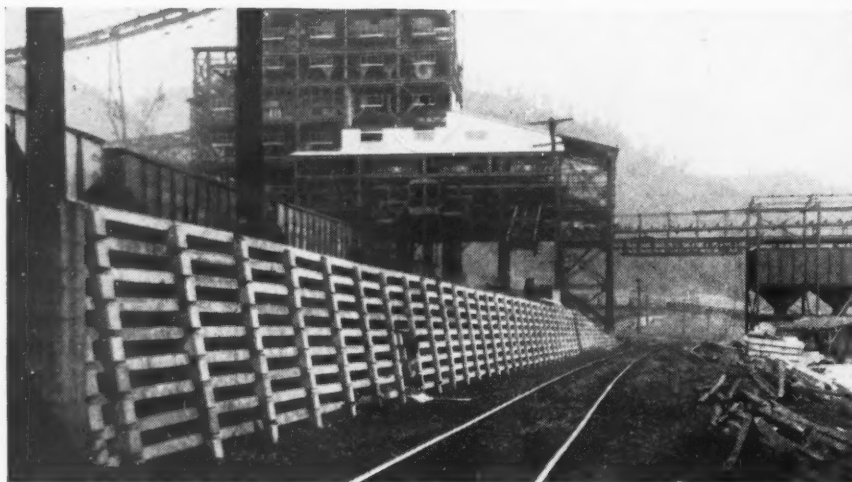
Listen to "Harvest of Stars" every Wednesday on your CBS station

**Standardize
on Power
that Pays**

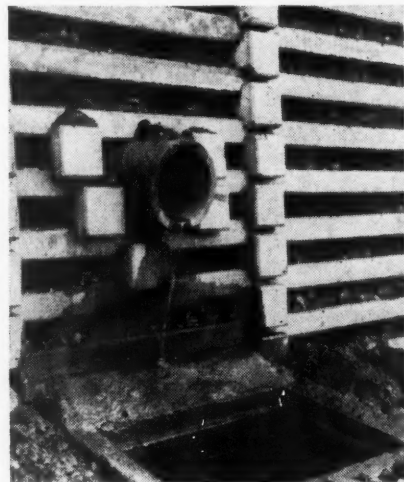
INTERNATIONAL

INDUSTRIAL POWER

**CRAWLER TRACTORS
WHEEL TRACTORS
DIESEL ENGINES
POWER UNITS**



CONCRETE-CRIB WALL supports six rail sidings at new tipple project of the Consolidation Coal Co. (W. Va.).



EXCESSIVE ground water is handled by installation of an 8-in. perforated pipe.

Concrete Cribbing Supports 600-Ft. Wall

USE OF CONCRETE CRIBBING was a feature in the construction of a 600-ft.-long wall ranging from 6 to 15 ft. in height recently completed at the Arkwright mine, Consolidation Coal Co. (W. Va.), Gandeeville, W. Va. The wall supports six railroad sidings, built to handle various gradations and sizes of coal as a part of a \$1,500,000 tipple project for both rail and river deliveries.

As the foundation was soft and unstable, stabilizing it required excavating 3 ft. below foundation elevation and backfilling with river gravel. The wall was constructed on a 2- to 12-in. batter and backfilled with limestone and river gravel. An 8-in. perforated pipe was installed below the heel of the wall to carry off excessive ground water.

The new wall withstood its first severe test shortly after it was completed, according to reports, when it was subjected to three days and three nights of hard rains.

The construction engineer on the project was J. W. Murray. The concrete cribbing was manufactured by the Universal Concrete Pipe Co. at its plant at New Martinsville, W. Va.

Wheels Salvaged by Grinding

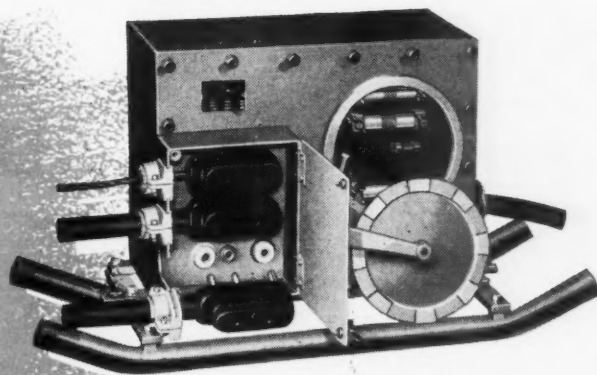


MINE-CAR WHEELS which develop flat spots are salvaged and reconditioned by grinding at the Gorgas mines of the Alabama Power Co. The grinding unit, shown in the accompanying illustration, consists of an 18-in. Cincinnati lathe, with the tool carriage modified to serve as a mount for the grinding motor and special wheel. The unit is mounted in a separate shed, since operation in the regular shop would result in throwing fine particles of metal into the air, where they would be carried into bearings and other parts of equipment being serviced or repaired.

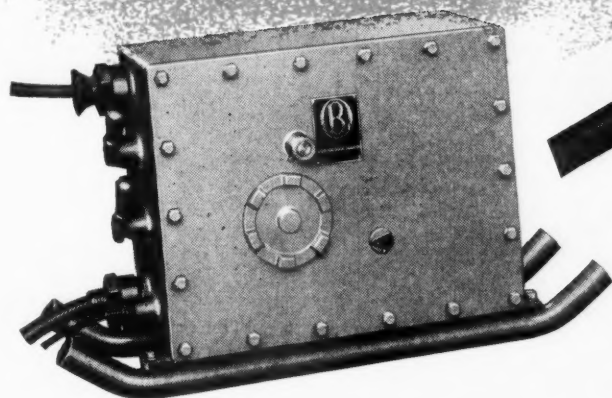
A wheel to be ground is mounted on the head stock of the lathe and rotated at 5 r.p.m. Speed of the grinding wheel is 3,600 r.p.m. By using the normal carriage motions, the entire surface of the wheel tread is ground off deep enough to eliminate the flat spot. Grinding off is considered better and cheaper than attempting to build up by welding, and the new tread surfaces thus formed have been found to be as good, and in some cases better, than the original. Chilled cast-iron wheels are used and, with an original thickness of approximately 1 in., three or more regrinds are possible with complete satisfaction. Regrinding is a spare-time job for a shopman, and the average is about 7 or 8 wheels per shift.

WHEEL GRINDER for reconditioning mine-car wheels that develop flat spots ready for action. Three or more regrinds are possible.

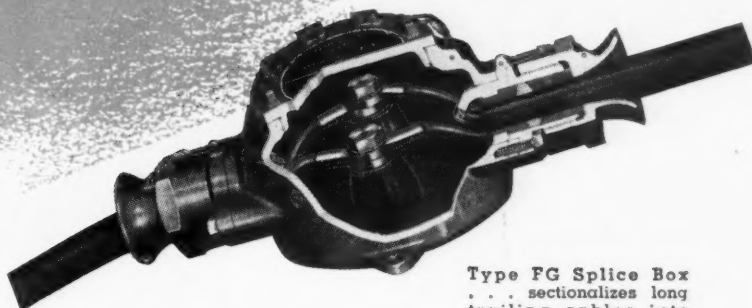
TO KEEP TONNAGE MOVING IN GASEOUS AREAS



Type LG Distribution Box . . . offers safe connection facilities for three branch circuits, each individually fused.



Type BDG Motor Starter . . . provides complete control plus overload protection for conveyor, pump, fan and compressor motors.



Type FG Splice Box . . . sectionalizes long trailing cables into shorter, easy-handle lengths.

...Distribute Power Through O-B Gas-Proof Control Equipment

Here is a trio of production-boosting devices that can help you stop electrical "slow-downs" in gaseous working areas. Each is designed to serve a necessary function in power handling at the face . . . the Type BDG Motor Starter to control and protect conveyor drives; the Type LG Distribution Box to provide three individually-fused branch circuits; and the Type FG Splice Box to sectionalize long, hard-to-handle trailing cables into shorter, easy-to-manage sections.

All three devices have been mine-engineered by men familiar with mine operating requirements. All have been explosion tested by the U.S. Bureau of Mines and APPROVED—the dis-

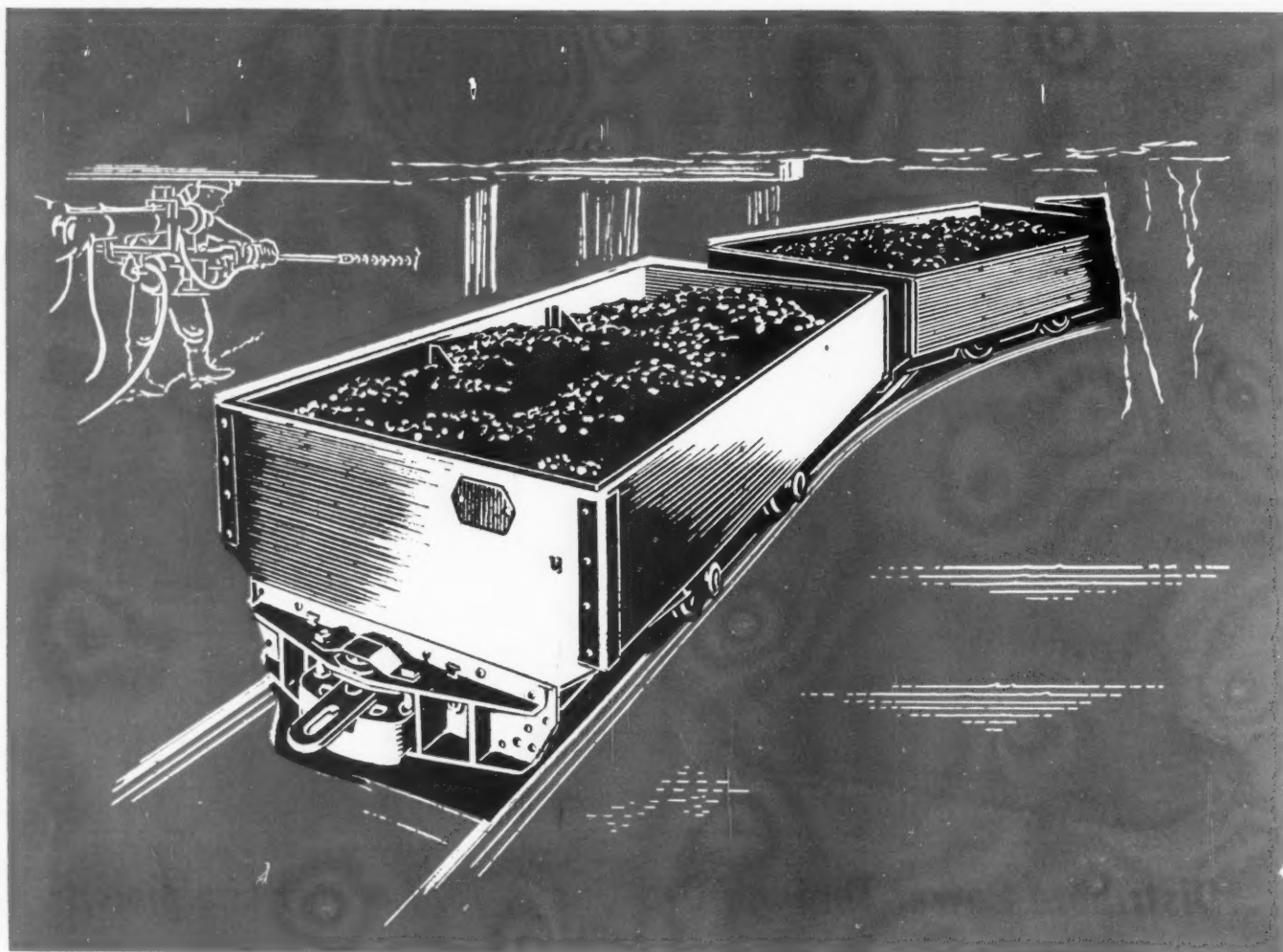
tribution and splice boxes as complete permissible units; the motor starter as being suitable for use with permissible equipment.

Why be satisfied with less? Install the best! Intrust your vital power lifeline to O-B Gas-Proof Control Equipment.

2838-M


Ohio Brass
MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ontario

YES! Tycol Akup and Acylkup Mine Car Greases perform better . . . BETTER . . . BETTER



Tycol Mine Car Greases perform better because:

. . . *Tycol Mine Car Greases* are engineered from specially selected cylinder oil stocks, expertly blended with calcium soap to assure long bearing life.

. . . *Tycol Mine Car Greases* exhibit minimum penetration changes, permitting application in and out of the mine.

. . . *Tycol Mine Car Greases* reduce low temperature drag—more cars per haul.

. . . *Tycol Mine Car Greases* retard lubricant leakage at high temperatures—furnish lower output costs per pound of grease.

For more information about Tycol Mine Car Greases write, wire, or phone your nearest Tide Water Associated Office.

LUBRICATION — “ENGINEERED TO FIT THE JOB”



**Boston • Charlotte, N. C.
Pittsburgh • Philadelphia
Chicago • Detroit • Tulsa
Cleveland • San Francisco**



News Round-Up



Industry Economic Study Published by N.C.A.

"More capital equipment" is the foremost economic need of the bituminous coal industry according to a study of the industry mailed last month to its members by the National Coal Association. The 59-page report, which includes about 30 pages of charts and tables, was compiled by Dr. Donald R. G. Cowan, Cleveland, Ohio, N.C.A.'s consulting economist.

"Many coal companies should take practical steps to conserve their earnings and invest them in capital improvements," said Dr. Cowan, "in order to exploit the spiral of success. This is the surest way of retaining private enterprise in the coal industry. The opportunity to do so may not be so favorable again for many years."

The summary outlines the bituminous coal industry's economic situation up to World War I, in the period between World Wars I and II, during the recent war, and afterwards to the present time. It shows comparative trends of labor-saving and profits in coal and other industries, discusses competition from other fuels, points to progress in combustion engineering, and recommends that the industry "must extend the use of machinery wherever physical and economic conditions offer opportunities for doing so."

NLRB Delays Hearing On Union Shop

The government and John L. Lewis have been given until Sept. 8 to prepare and submit briefs in the government's action alleging unfair labor practices by the U.M.W.A. The charges are based on the union-shop clause incorporated in the 1948 wage agreement signed in June. The delay was granted by NLRB Trial Examiner William R. Ringer, who thus postponed a possible court ruling for several months. Mr. Ringer's decision probably cannot be reached before Oct. 1. That would delay the full NLRB hearing until Nov. 1.

In preliminary arguments July 26, when Mr. Ringer postponed further hearings, the U.M.W.A. contended that it did not need to hold an NLRB election on the union shop, as provided in the Taft-Hartley Act, because

Featured in This Section

Personal Notes	p. 128
Coal and Business Activity	p. 130
Obituary	p. 134
New Developments	p. 144
Association Activities	p. 156
Preparation Facilities	p. 156
Coal Publications	p. 164

Mr. Lewis and his negotiators were authorized to bargain for the miners by action of the U.M.W.A. convention. In earlier hearings July 22 and 23, the government had presented its evidence, consisting largely of statements by Harry M. Moses, representing the "captive" operators, and Joseph E. Moody, president, Southern Coal Operators' Association.

The hearing before a NLRB trial examiner on a charge of refusing to bargain filed in June by the Southern Coal Producers Association against the U.M.W.A. has been postponed until Oct. 12.

Rail Freight Rates Again Upped by I.C.C.

A further increase in freight rates, effective Aug. 21, was granted by the Interstate Commerce Commission July 29 in releasing its findings in Ex Parte 166, which constitutes its final report in the proceedings. The new order supercedes the three previous interim rate authorizations of Oct. 13, 1947, and Jan. 5 and May 6, 1948.

On anthracite and bituminous coal and coke a 20-percent increase in the rates in effect prior to Oct. 13, 1947, is granted, with a maximum of 2c. per 100 lb. or 40c. per net ton. For lignite and lignite briquettes the increase is 10 percent, maximum 1c. per 100 lb. or 20c. per net ton.

Comparison of the new rates with those in effect recently was not immediately available, since rates between specific points must be computed with the rates in effect prior to last Oct. 13 as the base.



RADIANT-HEATING COILS will provide winter warmth in ...

Birmingham's Coal-Heated Welfare Building

A stoker-fired coal boiler will be used this winter to provide hot water for a radiant-heating system installed in the new \$114,000 Welfare Office building, Birmingham, Ala. The one-story structure, with 28 rooms, was completed just recently. The coil layout for the radiant-heating system

includes 1½ miles of 1-in. wrought-iron pipe embedded in a concrete floor slab topped by asphalt tile-finish surfacing. Coal storage and boiler room are located in a partial basement. Cost of the entire heating system was reported to be about 6 percent of total building cost.



Federal Mine Inspector Honored for Courage

JOHN E. BRADBURN (above), federal inspector, Madisonville, Ky., last month became the first federal inspector to be granted a salary advancement under the Department of Interior's program for recognizing superior accomplishments, in recognition of his performance of an act of valor over and above the call of duty during mine-rescue operations in a Kentucky coal mine.

Inspector Bradburn was cited for displaying courage and deliberate reasoning under extremely dangerous circumstances, probably saving his own life and the lives of three co-workers and six miners who were trapped in the Belva No. 1 mine, Bell County, Kentucky, while in charge of the Bureau's recovery operations following an explosion in December, 1945.

Now 59, Mr. Bradburn began working in a coal mine at the age of 13, advancing from laborer to fireboss in seven years. He was with the Pittsburgh Coal Co. for 24 years, becoming a mine superintendent. He also served as safety engineer and in other capacities with outstanding mines in Pennsylvania, Ohio and West Virginia, joining the Bureau in 1941.

Personal Notes

Duquesne Light Co., Pittsburgh, Pa., recently announced three new appointments in its Coal Department, as follows: **James E. Elkin**, formerly superintendent, Warwick mine, has been made assistant general superintendent succeeding J. A. Younkirs, who resigned earlier this year. **James H. Truax**, formerly production engineer, Warwick mine, has been named mine superintendent to succeed J. M. Provost, who retired recently. **John Stephenson** has been appointed superintendent, No. 2 mine, Warwick, thus moving up to the



NEW BUREAU OF MINES OFFICIALS—The appointment of William J. Fene (left) as assistant chief, Health and Safety Division, and Marling J. Ankeny (right) as chief, Coal Mine Inspection Branch, was announced last month by the U. S. Bureau of Mines. Mr. Fene has been associated with the Bureau for 28 years in various positions and for the past three years has been assistant chief, Coal Mine Inspection Branch. Mr. Ankeny, who first joined the Bureau in 1928, was formerly special assistant to the chiefs of the Health and Safety Division and the Coal Mine Inspection Branch.



vacancy created by Mr. Elkin's promotion. Mr. Elkin has been with the company since 1942, Mr. Truax since 1944 and Mr. Stephenson since 1927.

Robert S. Lewis, professor and chairman, mining department, University of Utah has been retired after being associated with the university since 1912. Mr. Lewis is the author of several books on mining and was largely responsible for starting a complete university course in coal mining last year.

John Towers, Christopher, Ill., has been appointed mine inspector for Illinois District 13, consisting of Perry, Randolph and Jackson Counties. Formerly associated with The Consolidated Coal Corp., Nason, Ill., Mr. Towers fills the vacancy caused by the death of John Golden, DuQuoin.

Earl C. Payne has been named acting director, Fairmont Coal Bureau, 122 East 42nd St., New York 17, N. Y., succeeding Julian E. Tobey, who has resigned to become president, Appalachian Coals, Inc., Cincinnati, Ohio. Mr. Payne formerly was consulting engineer, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., and for several years has been a member of the bureau's management committee.

R. E. Powell has accepted a position in the engineering department, Truax-Traer Coal Co., Kayford, W. Va. Formerly, Mr. Powell was chief draftsman, engineering department, Island Creek Coal Co., Holden, W. Va.

Albert Goldworthy, who since 1946 has been foreman of the No. 3 and No. 4 collieries, Locust Coal Co., Shenandoah, Pa., has been made in-

side superintendent of the company to succeed H. D. Swartz, who has resigned to go into business as a rock contractor. Mr. Goldworthy has been with the company since 1944. Prior to that time, he was associated with the Philadelphia & Reading Coal & Iron Co.

Edmund W. Booker has been appointed superintendent, Gorgas mine, Alabama Power Co., Gorgas, Ala., to succeed George Nason, who has taken over operation of a truck mine.

Ballard J. Wright has been appointed assistant chief engineer of the Crozer Coal & Land Co. and the Page Coal & Coke Co., with offices at Elkhorn, W. Va., according to an announcement by Robert A. Nowlin, chief engineer for the companies. Mining properties of the two companies are located in McDowell County, West Virginia, with the main office in Philadelphia.

James C. Gray, general superintendent, coal mines division, T. C., I. & R. R. Co., Birmingham, Ala., has been

INVITATION!

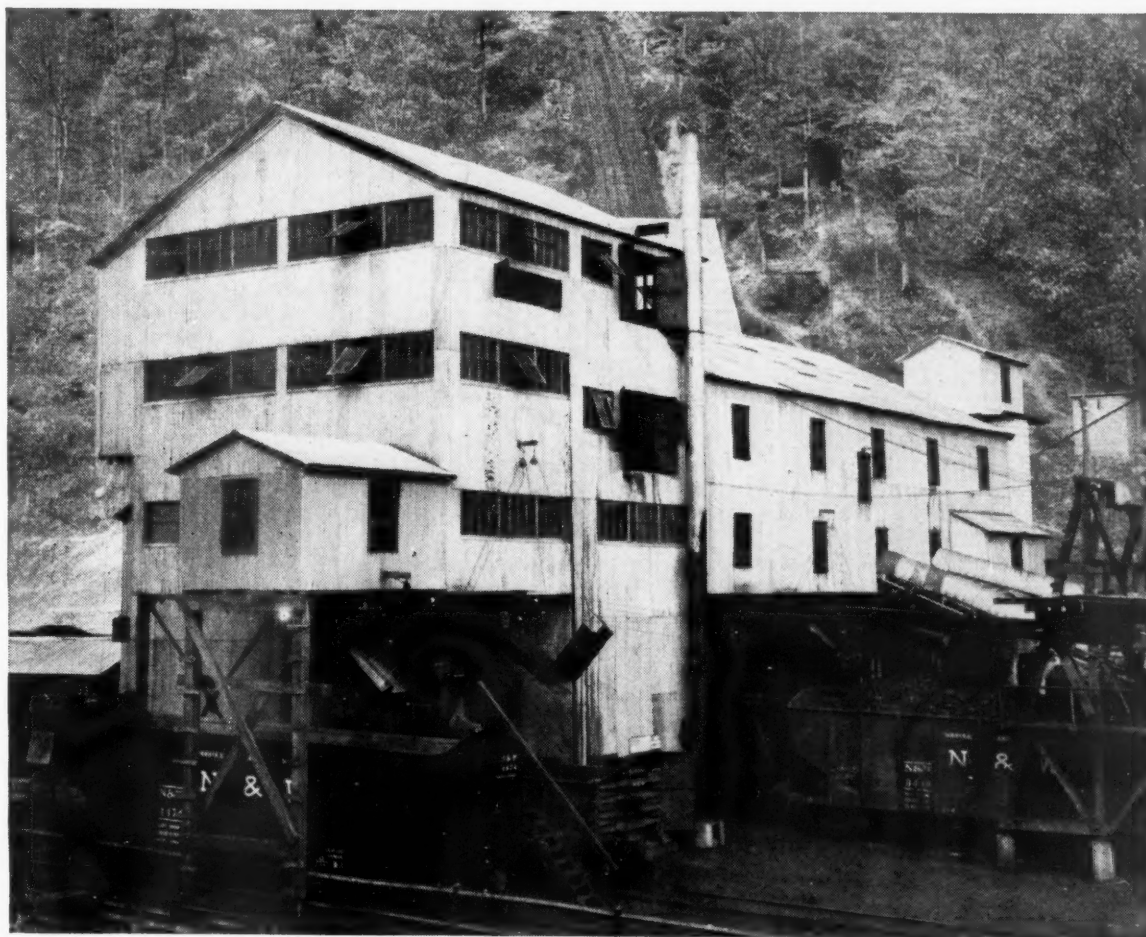
COAL-MINING OFFICIALS are invited to write us of changes in their position or news of personnel changes on their staff for inclusion in COAL AGE'S "Personal Notes" section. Friends and business acquaintances like to know of your progress, so why hold back! Also welcome is news of your company—new mine developments, safety and production achievements, annual staff functions, etc., accompanied by photographs where suitable and available. Address: News Editor, COAL AGE, 330 West 42 St., N.Y.C. 18.

THE CHANCE SAND FLOTATION PROCESS WITH ITS HIGH SEPARATING EFFICIENCY IS SAVING MONEY FOR THE GAY MINING COMPANY AT ITS MINES #1 & #2

THE CHANCE PROCESS WASHER AT THIS MINE IS OPERATING WITH LESS THAN 1% OF "SINK" MATERIAL IN THE CLEANED COAL AND LESS THAN 1% OF "FLOAT" MATERIAL IN THE REJECTS. THESE AND MANY OTHER OPERATING RECORDS SHOW **CHANCE** TO BE THE MOST EFFICIENT OF ALL COAL WASHERS NOW IN COMMERCIAL USE.

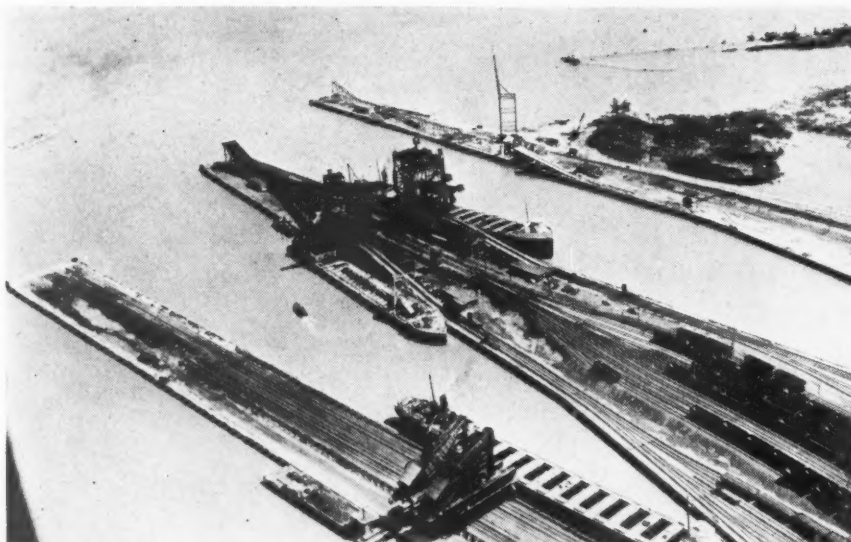


THE HEART OF THE PREPARATION PLANT



UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK 17 • PHILADELPHIA 5 • CHICAGO 2



Three coal-dumping machines, three-car-a-minute speed, feature . . .

NEW COAL AND ORE DOCK AT TOLEDO

Already in operation, the new \$18,-500,000 coal and ore dock of the Baltimore & Ohio and New York Central Railroads will be completed before the end of the current Great Lakes shipping season. By that time, the new facility will have three coal-

a 70-ton hopper car per minute, and two ore unloading machines that will remove ore from ships at the rate of 30 tons a minute. The two railroads eventually will be able to move as much as 20,000,000 tons of coal and 4,500,000 tons of ore during each shipping season.

Coal, Business and Industrial Activity

		1948 to This Date	1948 Over 1947, to Date
Est. anthracite prod., wk. ending Aug. 7.....	1,163,000	33,947,000	+ 1.2%
Est. bituminous prod., wk. ending Aug. 7....	12,155,000	343,768,000	- 6.1%

Source: U. S. Bureau of Mines.

	Bituminous Coal Stocks (Thousands, net tons)			Consumption (Thousands, net tons)	
	July 1, 1948	Days Supply	June 1, 1948	June, 1948	May, 1948
Electric power utilities	17,041	68	14,601	7,520	7,112
Byproduct coke ovens	10,474	39	7,762	8,036	8,185
Beehive coke ovens	a		a	851	908
Steel and rolling mills	1,269	48	1,074	798	822
Cement mills	1,361	59	1,001	690	692
Other industrials	17,234	67	14,034	7,661	8,056
Railroad (Class I)	8,787	35	7,208	2,432	7,766
Retail dealers	1,844	9	1,352	5,943 ^b	5,628 ^b
Total	58,010	45	47,032	38,931	39,169

Source: U. S. Bureau of Mines. ^aNot available. ^bRetail dealer deliveries.

	Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, week ending Aug. 14	194.3	194.0	184.4
Steel ingot operations (% of capacity)	95.0	93.1	92.8
Electric power output (million kw.-hr.)	5,318	5,197	4,923
Crude oil prod. (daily avg., 1,000 bbl.)	5,507	5,444	5,159
Misc. & L.C.L. carloadings (daily avg., 1,000 cars)	80	81	84
All other carloadings (daily avg., 1,000 cars)	67	66	67
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100)	428.0	431.2	421.4
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100)	279.2	275.6	268.3
Prices, domestic farm products (B.L.S., Aug., 1939 = 100)	355.3	382.9	374.5
Prices, finished steel composite (Steel, ton)	\$93.55	\$80.27	\$75.41
90 stocks, price index (Standard & Poor's Corp.)	125.5	127.9	122.9

*Date of latest week for each series on request.

named assistant manager of raw materials for the company. Mr. Gray first joined the company in 1939 as superintendent of its Wylam mine. A graduate of Pennsylvania State College, he was formerly associated with The Hudson Coal Co., Scranton, Pa. Ellwood B. Nelson, formerly assistant

general superintendent of the division, succeeds Mr. Gray as general superintendent. Stanley D. Michaelson has been appointed chief engineer of the coal mines division, and John M. Sponsler has been named to the newly created position of assistant chief engineer.

Gerald von Stroh, assistant manager, development engineering division, Lukens Steel Co., Coatesville, Pa., has been appointed director of the bituminous coal industry's program to develop a continuous mining machine, according to an announcement last month by Dr. Charles E. Lawall, chairman of B.C.R.'s Mining Development Committee. In his former position, Mr. von Stroh has supervised the development of earth-moving equipment and other heavy machinery and previously served in engineering capacities with Kaiser Services, Hughes Aircraft Co. and Consolidated Aircraft Corp.

B. Arnold Workman, general superintendent, The Lorado Coal Mining Co., Lorado, W. Va., has resigned to enter the contracting and building business in Blacksburg, Va. Mr. Workman was born in Lorado and first worked for the company part-time while still in school. Upon graduation from high school in 1937, he joined the company as a track helper and later held various supervisory positions, becoming general superintendent in June, 1946.

A. F. Castanoli, chief preparation engineer, Robinson & Robinson, Charleston, W. Va., has resigned to join with John Amos to form Castanoli & Amos, consulting engineers, with offices in Huntington and Mt. Hope, W. Va. Mr. Castanoli for some years was technical engineer for Pocahontas Fuel and Koppers Coal Division.

Leslie W. Pullen, formerly associated with the Oliver Iron Mining Co., Hibbing, Minn., has joined the engineering department of the Island Creek Coal Co., Holden, W. Va., as assistant mining engineer. During the war Mr. Pullen served with army engineers with the rank of first lieutenant and also was previously associated with Republic Steel Corp., at Mineville, N. Y.

Several changes in supervisory personnel have been announced by the Consolidation Coal Co. (W. Va.), Fairmont. At Everettville mine, Frank L. Berry has been promoted from section foreman to mine foreman, and Charles E. Herndon has been made assistant mine foreman. James G. Thompson, section foreman, Mine No. 98, Nora, has been advanced to assistant mine foreman.

Promotions to section foremen at five other of the company's mines also were reported, as follows: Mine No. 25, Clarksburg, Jack Light and Berlin A. Wright; Mine No. 32, Owings, Paul F. Watson and French Richards; Mine No. 38, Fairmont, Raymond Logue; Mine No. 63, Monongah, Peter W. McGraw and Ralph J. Mick; Mine No. 93, Jordan, E. W. Ramsey and Paul Zickefoose.

Thomas F. Steele, president, T. F. Steele Coal Co., Junedale, Pa., has

The NEW

Thor

"200" STOPER ROCK DRILL

**SPEEDS
TUNNELLING**

LARGE TONNAGE PRODUCING MINES find Thor No. 200 Stoper "pays for itself" where over-head rock must be removed in tunnelling haulage roads for high speed movement of mechanized equipment.

Light . . .

Small . . .

POWERFUL . . .

Easy to Handle . . .

With automatic feed, one No. 200 Stoper gets the drilling done as fast as two crews with hand-held hammers! Many exclusive features are incorporated in the 75-pound Thor No. 200—automatic rotation . . . an exceptionally long-life chuck that permits swedging when worn . . . automatic oiling to *all* parts . . . closed side rod nuts . . . fully air cushioned piston . . . and oversize feed leg for stability. Call your Thor distributor for a demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY

Aurora, Illinois

Export Division: 330 West 42nd Street, New York 18, N. Y.

Birmingham	Boston	Buffalo	Cincinnati	Cleveland	Denver	Detroit	Houston
Los Angeles	Milwaukee	New York	Philadelphia	Pittsburgh	St. Louis	St. Paul	
Salt Lake City	Seattle	San Francisco	Toronto, Canada	Sao Paulo, Brazil	London, England		

Thor

PORTABLE POWER

TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



**Here's a
Better-than-New Idler
for \$25⁹⁶**

**This is how P&H Hartop
hard-surfacing electrodes cut equipment
downtime, raise man-hour production,
reduce maintenance costs**

Here's an idler that is being hard-surfaced with P&H Hartop so that a tractor can get back to work in a hurry. The cost of doing this particular job is only \$25.96, counting both labor and electrodes.

And that's the beauty of Hartop. It helps you make repairs quickly and easily. You don't have to wait for repair parts. Your machinery stays on the job longer. Your man-hour production is greater. You see, worn parts hard-surfaced with these easy-to-use electrodes outwear new parts 2 to 3 times. That is why you get more work done and your costs are lower.

The Hartop series consists of four types of electrodes — with Rockwell C hardness ratings as follows: Hartop Brown, 35 to 40. Hartop Green, 45 to 50. Hartop Red, 50 to 55. Hartop Yellow, 58 to 63.

Maintain and repair with Hartop. \$4.25 buys you our trial package of all 4 types of these money-saving electrodes. Get a few packages today from your P&H distributor. Or write us for prompt delivery.



been appointed by Gov. James H. Duff of Pennsylvania, as alternate member of the Anthracite Committee for Bruce Payne, succeeding John C. Had-dock of Wilkes-Barre, resigned.

John Towers, associated with the Consolidated Coal Corp., at Nason, Ill., has been appointed Illinois state mine inspector for District 13, which includes Perry, Randolph and Jackson Counties. Mr. Towers succeeds John Golden, of DuQuoin, deceased.

John Kirkman "Jack" Berry, formerly head of industrial engineering, Island Creek Coal Co., Holden, W. Va., has been named production engineer for the Consolidation Coal Co. (Ky.), Jenkins, Ky. A number of recent promotions also have been announced by Consol. At Mine No. 214, **Peter V. Mancini**, transitman, has been appointed engineer. **Luther Varner**, trackman; **Wannie Flint**, timberman; and **Allard Wright**, motorman, have been promoted to section foremen at 214.

Henry Shackleford has been advanced from section foreman to mine foreman, and **Roy Sturgill** from section foreman to assistant mine foreman at Consol's Clover Splint mine. **Oscar Jennings**, motorman at Clover Splint, has been made dispatcher, and **Argie Miller**, former state mine inspector, who joined Consol last February, has been named section foreman. **Theodore Hensley**, mine examiner, and **Harry C. Brown**, machineman, have been appointed section foremen at Clover Splint. **J. C. Ward**, conveyor faceman, Mine No. 155, has been advanced to section foreman at that mine. **Loy Joseph Hammer**, shovel operator at the company's strip mine, has been promoted to pit foreman.

International Safety Meet Scheduled for Pittsburgh

Resuming an international program for mine-safety research interrupted by the war, the Fifth International Conference of Directors of Mine Safety Research was scheduled to convene Sept. 20-25 at the Central Experiment Station, U. S. Bureau of Mines, Pittsburgh, Pa. The first conference was held in England in 1931 and meetings were held every two years thereafter in France, Germany and Belgium. The conference planned for Pittsburgh in 1939 was deferred because of the war.

Eleven official delegates from five countries, England, France, Belgium, Poland and Germany, have been invited to attend the conference, which will deal with fundamental scientific research on which safety recommendations are based. Among the subjects to be discussed are explosives, fire damp, coal dust, electricity and haulage, mine safety and fires. The meeting will be attended by various

New Mantrip cuts costs—



Cable that *CAN'T BE BOTHERED!*

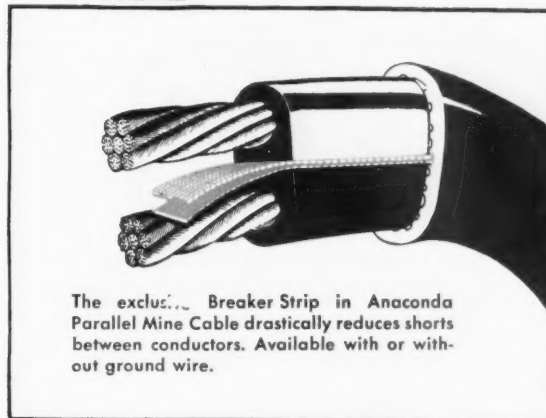
EXCLUSIVE ANACONDA BREAKER-STRIP construction and *adhesion* between jacket and insulation that makes a solid block around conductors, combine to make Securityflex* Parallel Mine Cable first in safety because it is *crush-resisting*.

Breaker strip guards against shorts!

That isn't all. Neoprene jacket protects against flame and is highly resistant to both tearing and abrasion. Securityflex mine cable won't kink or twist... stands up longer under severe abuse and extreme overloads. Cable meets Bureau of Mines Flame Test and diameter specifications.

Put a length on trial. From then on, you'll always specify Securityflex. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trade-Mark



The exclusive Breaker Strip in Anaconda Parallel Mine Cable drastically reduces shorts between conductors. Available with or without ground wire.

ANACONDA

Securityflex

MINE CABLE

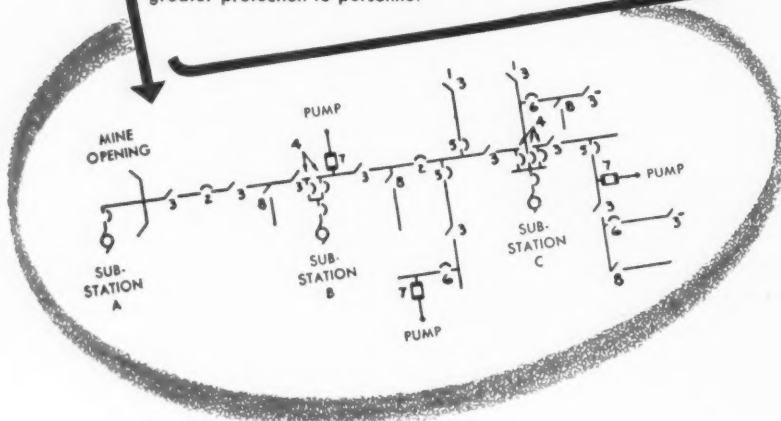


Boost Production Tipple-high- APPLY AN I-T-E SECTIONALIZING PLAN LIKE THIS



The diagram below shows a few applications of I-T-E Sectionalizing Switchgear to mine electrical distribution systems. We can offer you many recommendations for raising production levels, and for giving greater protection to personnel

and equipment. The I-T-E representative in your locality is fully qualified to assist you in adapting these sectionalizing recommendations for your mine. Use his services with no obligation.



Key

1. I-T-E Type KSC Automatic Reclosing Circuit Breaker installed as overcurrent protective device between each two substations. The KSC protects feeders and equipment by detecting disturbances on either side.
2. A disconnect switch or protective device placed at not over 1500-foot intervals in every power line.
3. I-T-E Type KSA Automatic Reclosing Circuit Breaker used as an overcurrent protective device in each circuit leaving a substation.
4. I-T-E Type KSC used as an overcurrent protective device in each main branch circuit. It is rugged and compact in construction, readily portable, and can be moved as mining progresses and centers of loads change.
5. I-T-E Type KSC used as overcurrent protective device in secondary branch circuits.

Key

6. Circuits to pumps and other fixed loads have overcurrent protection at their supply ends.
7. Unimportant branch circuits such as infrequently used entries, spur tracks, etc., have switches for cutting off all power.

NOTE: In every case, sufficient feeder and return circuit capacity should be provided so that the circuit breaker will be opened by a dead short at the most remote point of the circuit.

The Heart of Protection . . . TYPE KSC

AUTOMATIC RECLOSING CIRCUIT BREAKER

Be Production-Wise...Sectionalize



S-E-C-T-I-O-N-A-L-I-Z-I-N-G
SWITCHGEAR
The Leader in Technical Excellence

I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Phila. 30, Pa. 31 Offices in U. S. & Canada

SWITCHGEAR • UNIT SUBSTATIONS • AUTOMATIC RECLOSING CIRCUIT BREAKERS

been appointed by Gov. James H. Duff of Pennsylvania, as alternate member of the Anthracite Committee for Bruce Payne, succeeding John C. Hadlock of Wilkes-Barre, resigned.

John Towers, associated with the Consolidated Coal Corp., at Nason, Ill., has been appointed Illinois state mine inspector for District 13, which includes Perry, Randolph and Jackson Counties. Mr. Towers succeeds John Golden, of DuQuoin, deceased.

John Kirkman "Jack" Berry, formerly head of industrial engineering, Island Creek Coal Co., Holden, W. Va., has been named production engineer for the Consolidation Coal Co. (Ky.), Jenkins, Ky. A number of recent promotions also have been announced by Consol. At Mine No. 214, Peter V. Mancini, transitman, has been appointed engineer. Luther Varner, trackman; Wannie Flint, timberman; and Allard Wright, motorman, have been promoted to section foremen at 214.

personnel of the U. S. Bureau of Mines, many of whom are expected to present papers. A major topic of informal discussion will be England's experiments in mine illumination, including underground floodlighting. According to reports, previous international conferences have proven worthwhile in coordinating the various phases of research being carried on by the countries and in cooperation and exchange of information on their work.

H. P. Greenwald, superintendent of the Bureau of Mines' experimental station in Pittsburgh, is chairman of the arrangements committee for the conference. A committee of industry representatives, headed by John T. Ryan Jr., Mine Safety Appliances Co., is cooperating with the Bureau in setting up the meeting.

Obituaries

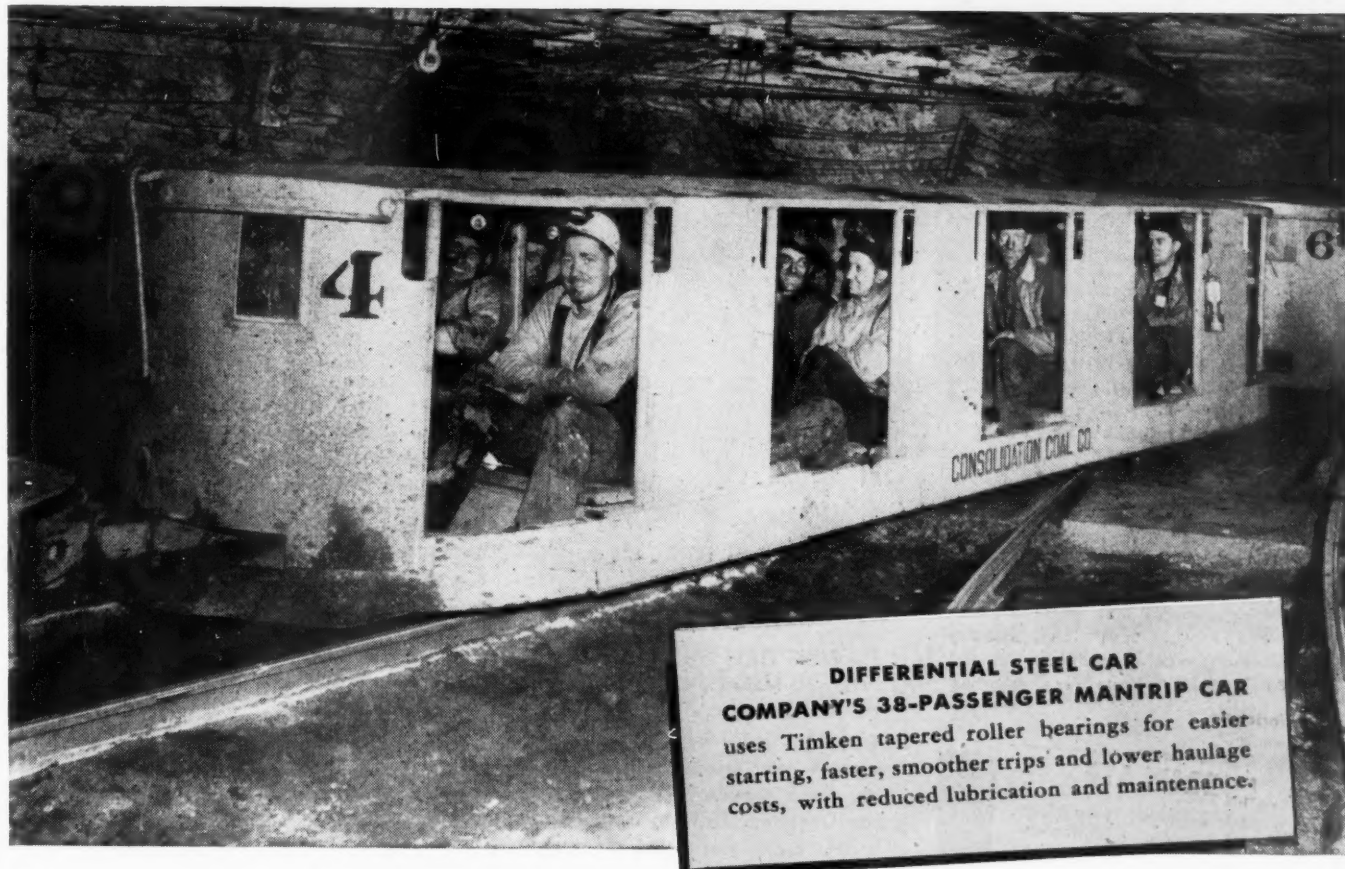
Herbert Morris, 54, mine foreman, West Side Coal Co., Luzerne, Pa., was instantly killed Aug. 14 by a fall of rock which occurred near the end of the shift. Mr. Morris had been mine foreman at the operation for nearly 10 years and had previously held a similar position with the Kingston Coal Co.

F. D. Hart, 76, president, Excelsior Coal Co., Middlesboro, Ky., died Aug. 2 in Middlesboro after a short illness. Mr. Hart was owner and publisher of the Middlesboro *Daily News* for seven years prior to 1930.

William C. Davis, 48, personnel director, West Kentucky Coal Co., Earlinton, Ky., since 1944, died Aug. 4 in an Evansville, Ind., hospital, following a heart attack. Mr. Davis was at one time mayor of Sturgis, Ky.

Mrs. Carrie Morgan Wright, 69, president, Raleigh Coal & Coke Co.,

New Mantrip "streamliner" speeds trips, cuts costs—on Timken® bearings



DIFFERENTIAL STEEL CAR
COMPANY'S 38-PASSENGER MANTRIP CAR
 uses Timken tapered roller bearings for easier starting, faster, smoother trips and lower haulage costs, with reduced lubrication and maintenance.

MINERS travel with greater speed, comfort and safety in the new mantrip cars now being supplied to important mines by the Differential Steel Car Company.

Like most other modern mine equipment, these cars are equipped with Timken tapered roller bearings. Due to their tapered construction and the line contact between rolls and races, Timken bearings are particularly adapted to take the

severe thrust and heavy radial loads encountered in mine car service. Their true rolling motion and incredibly smooth surface finish reduce friction to a minimum, permitting easier starting and higher speeds, with lower haulage costs.

Effective closures keep lubricant *in* and dust, grit and moisture *out*, resulting in extremely long life and negligible service time for lubrication.

Remember, no other bearing can give you all the advantages of Timken tapered roller bearings. Insist on them for every new mine car you buy. Look for the trade-mark "Timken" on the bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



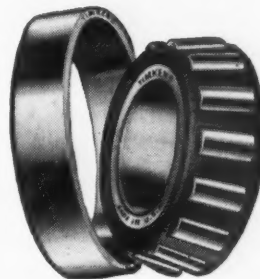
This symbol on a product means its bearings are the best.

TIMKEN BEARING CAPACITY RATINGS INCREASED 25%.

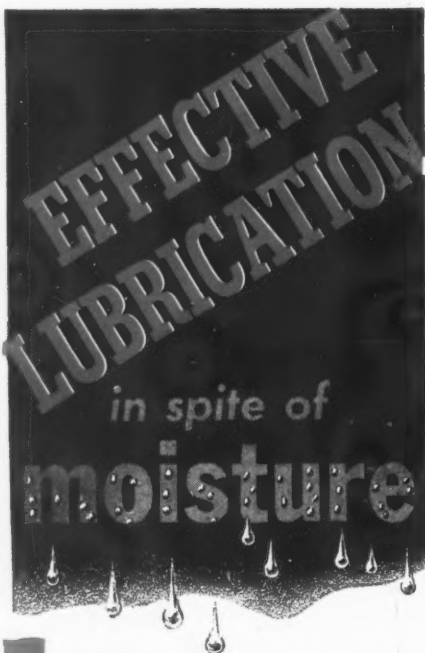
Since Timken bearings were last re-rated some 15 years ago there has been such a further and constant improvement in quality that we are now able to announce a 25% increase in radial and thrust load carrying capacity. This may make possible the use of smaller bearings with savings in bearing cost, material cost and weight. Engineers will be able to utilize the advantages of Timken bearings in more applications than in the past.

A new Timken Engineering Journal, now in preparation, will give you complete capacity rating tabulations. For further assistance, write us today.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
**TAPERED
 ROLLER BEARINGS**



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION



Operation of production machinery in the presence of moisture, steam and acids has always been a serious problem in many processing industries. There are a number of LUBRIPLATE lubricants that satisfactorily meet these unfavorable operating conditions, thereby protecting machine parts against rust and corrosion. Write for interesting particulars.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.



LUBRIPLATE

FISKE BROTHERS REFINING CO.
NEWARK 5, N. J. TOLEDO 5, OHIO

DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

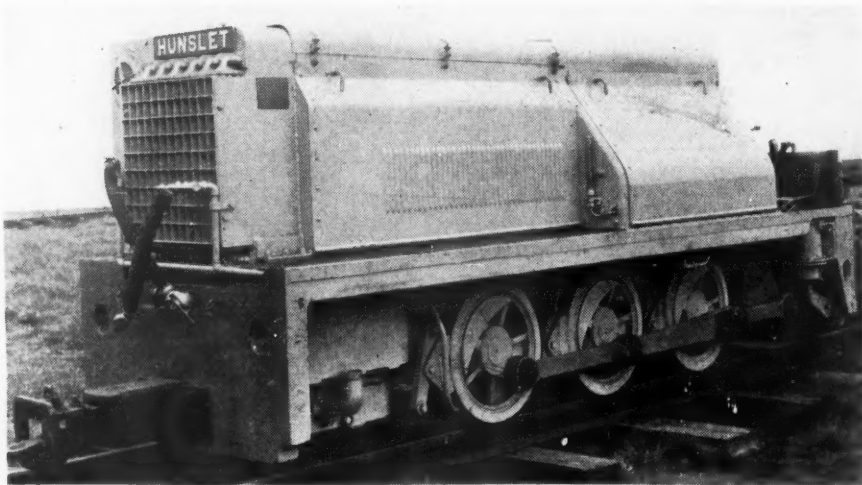
Beckley, W. Va., died Aug. 6 at her home in Cincinnati, Ohio. Mrs. Wright was the widow of John M. Wright, former president of the company, which was the first coal operation in

Raleigh County and is celebrating its 50th anniversary this year. Mrs. Wright also was the owner of the Black Knight Country Club in Beckley.



Repplier Team Takes Anthracite Safety Honors

PLACING FIRST in the Fourth Annual Safety Day and First Aid Meet Aug. 7 at Lakewood Park, near Mahanoy City, Pa., in competition with 17 other first aid teams from 10 anthracite companies, was this team of the Repplier Coal Co., Buck Run, Pa. The team, which in addition to individual loving cups, received \$150 in prize money, includes: Peter McDonald, captain, Peter Gawley, Michael Kovich, Malvern Price, Michael Shapansky, John Kunigonis, and Jacob Yacilla. The event was arranged by the Middle and Southern Individual Anthracite Operators' First-Aid Meet Association, with Timothy A. Ryan, Pennsylvania state mine inspector, acting as chairman of the meet. The competition was attended by many prominent federal, state, company and union officials, in addition to a large crowd of spectators.



SPEEDING UNDERGROUND transport may help solve output lag as . . .

Britain Orders Diesel Locomotives for Mines

BRITAIN'S NATIONAL COAL BOARD has placed with the Hunslet Engine Co., Ltd., Leeds, Yorkshire, an order for 152 underground flameproof diesel locomotives, valued at some \$3,000,000, to speed underground transportation and boost coal production. The order is part of \$36,000,000 allocated for the purchase of mining machinery, which will include 1,500 coal cutters, 3,000 belt conveyors and 1,200 other conveyors. The diesels will be standard type ranging from 65 to 100 hp. and will be fitted with exhaust-conditioning and flameproofing equipment. They will be delivered by the end of March, 1949.

LOOK TO



FOR ADDED VALUES



THEY'RE

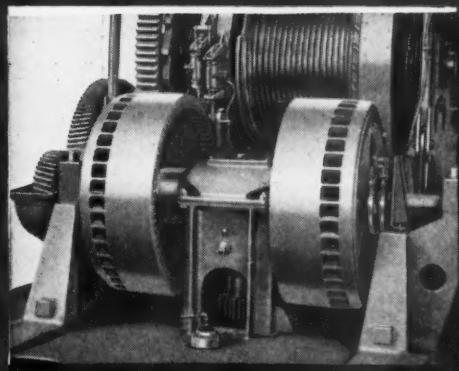
SWINGING

TO THE **MAGNETORQUE!**

Perhaps you've wondered why so many users are buying—and reordering—the P&H 1055. One reason for this mounting preference is the Magnetorque swing. Once you've owned a machine with it you won't be happy with anything else.

It's the greater smoothness—easier operation—greater speed—the freedom from upkeep and repairs—that will sell you the way they have sold so many other experienced users. These are extra benefits—added values—that make the P&H 1055 the fastest selling machine of its size and class.

If you'd like to inspect a 1055 at work, ask us to tell you where you can see the one nearest you.

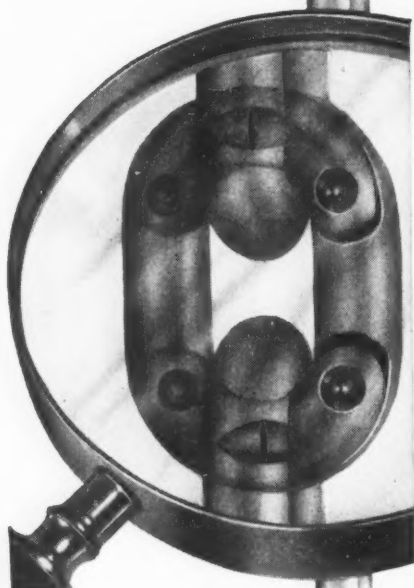


THE P&H MAGNETORQUE UNIT does away with all friction on swing and propel motion, thus eliminating the greatest single source of wear and maintenance. It lasts the life of the machine.

P&H**EXCAVATORS**4540 W. National Ave.
Milwaukee, Wis.**HARNISCHEFGER**
CORPORATION

EXCAVATORS • ELECTRIC CRANES • RIG MOUNTS • P&H • PUMPS • WELDING ELECTRODES • MOTORS

The
Laughlin
"MISSING LINK"
With
Interlocking
Safety Lugs



Here's a repair link that locks on to stay... is stronger than proof coil chain itself... is applied in a jiffy! Specify Laughlin "Missing Links"... get extra security at real

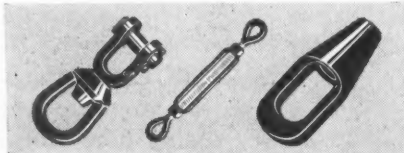
savings in time and money. All sizes from $\frac{3}{16}$ " to $1\frac{1}{4}$ ", inclusive. Write for Catalog 140... the data book of the fitting industry.

Address THE THOMAS LAUGHLIN CO., Dept. 6, Portland 6, Maine.

*Copyrighted.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



Mine Models Popular With Supervisors

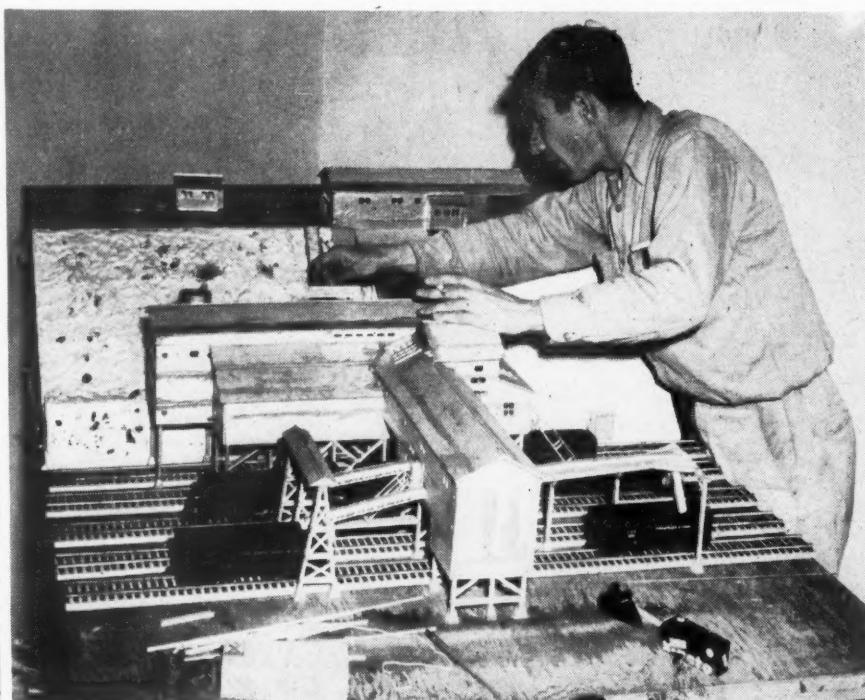


USSteel News

UNDERGROUND EQUIPMENT and mine details are shown in . . .

Working-Place Model Built by Fall Boss

A MINIATURE working-place model, built almost entirely of wood and complete with timber, cribs, mine cars, electric motors, track and men, has been built in leisure hours by John Kovach, Jr., fall boss, Palmer mine, H. C. Frick Coke Co., Palmer, Pa. House current drives the locomotive which pulls cars along the track and into the place where they are to be filled.

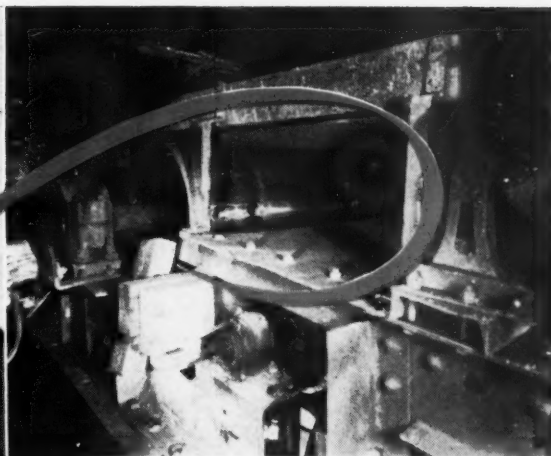
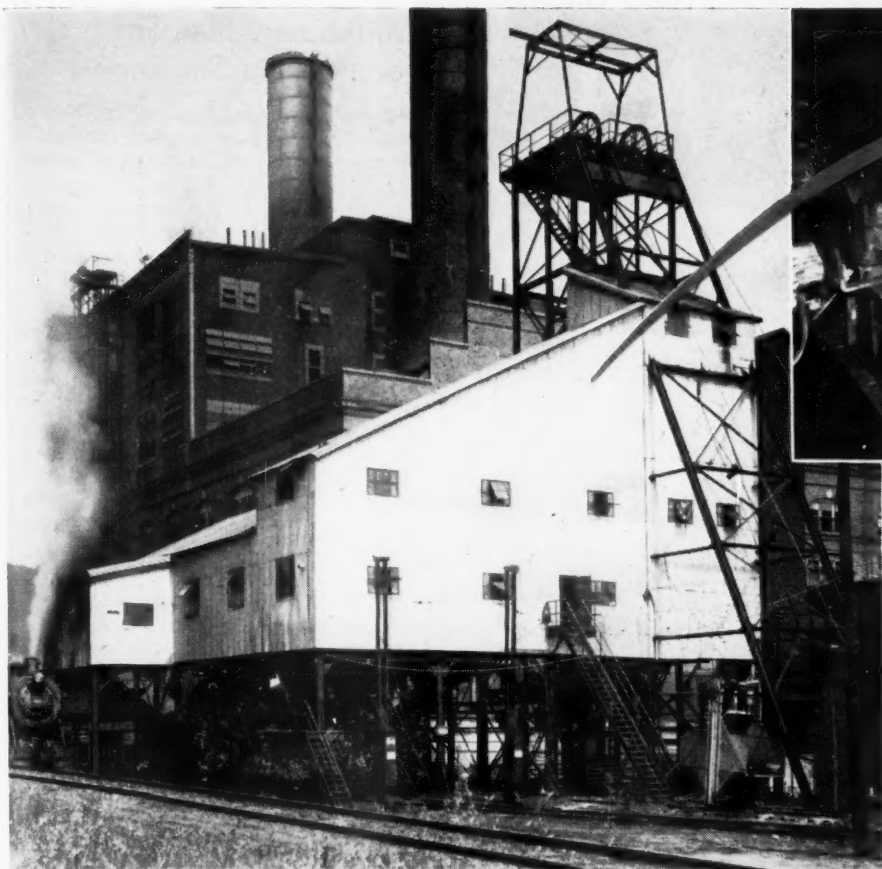


Raleigh Register

Model Tippie Is Superintendent's Hobby

Fred Reinhard, superintendent, Big Stick No. 2 mine, Lillybrook Coal Co., Abney, W. Va., spends his spare time building a working model of the Lillybrook No. 3 mine tippie, where he

used to work. Changing over from model airplanes, Mr. Reinhard began the tippie model in 1941. The model is complete in every detail, as the photo shows. The scale is $\frac{1}{4}$ in. to 1 ft.



This 24" diameter by 30" belt width Eriez Permanent Magnetic Pulley is handling 175 tons of coal per hour. Coal is hoisted from the mine to the tippie where it passes over the pulley. Tramp iron must be removed since part of the coal is conveyed to a power house and the rest is sold commercially.

Says the Preparation Engineer:- *"Eriez* NON-ELECTRIC PULLEYS Give Better Protection Than Ever Before"

"SINCE switching to an Eriez Non-Electric Permanent Magnetic Pulley, we have received better magnetic protection than ever before—as well as reduced operating, repair and maintenance costs. Because of its steady and economical operation, it has been recommended for use in our other mines."

This is a typical report received from a large mine in northern West Virginia, on the newest and most modern method of magnetic separation with Eriez Permanent Magnets. Your first cost is last cost since Eriez magnets are completely self-sustaining and the magnetic strength will last indefinitely. No electric current is needed . . . no maintenance . . . slip rings, coils, rectifiers and other electrical accessories are eliminated . . .

If you have a magnetic separation problem—it will pay you to investigate the complete line of Eriez Permanent Non-Electric Magnetic Separators. Call in an Eriez engineer today and ask him to explain the many advantages of the Eriez method of magnetic separation. Write, wire or phone Eriez Manufacturing Co., 60 East 12th St., Erie, Pa., U. S. A. Representatives in all major cities.

CLIP AND MAIL TODAY
Please send bulletin No. 102B

CA-9

We would like to know more about installation of ERIEZ on:
☐ Gravity Conveyors ☐ Mechanical Conveyors
☐ Equipment on Processing Machines

Name
Address City State

● *When It's Magnetic Protection . . . See Eriez First*



ERIEZ MANUFACTURING COMPANY

60 East 12th Street, Erie, Penna.

I'M YOUR MAN

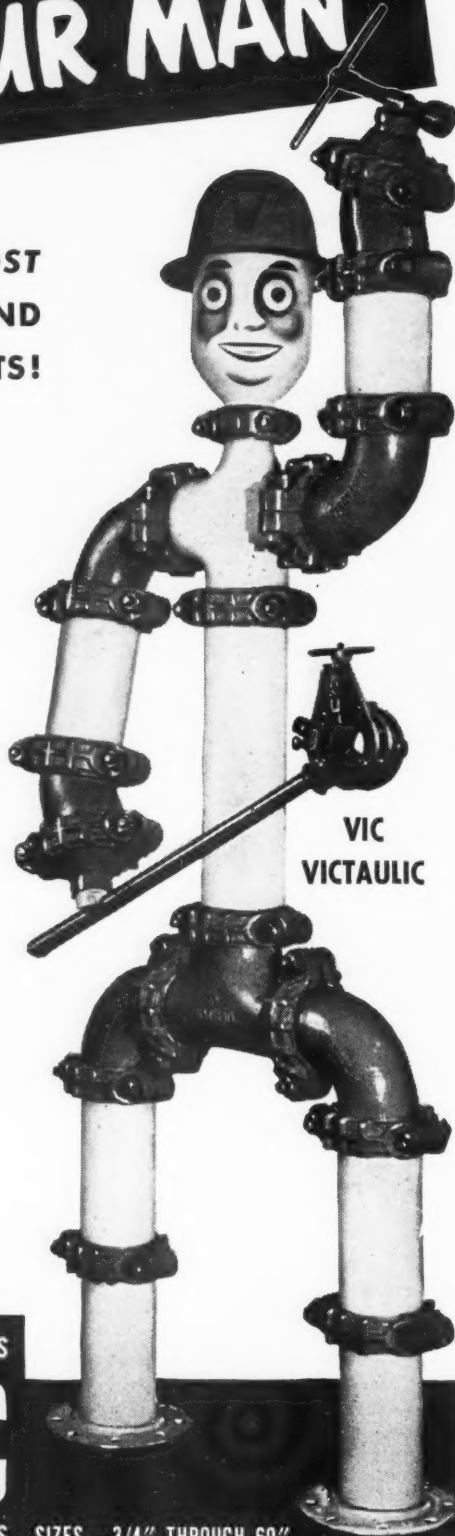
FOR SPEEDY, LOW-COST INSTALLATIONS . . . AND LOWER PUMPING COSTS!

ON "VIC VICTAULIC" at the right you see the famous Victaulic Couplings that will button up any piping system with a few fast turns of a standard T-wrench. No guesswork...no specially skilled or trained labor needed. Save money, save man-hours—with the two-bolt simplicity of Victaulic Couplings!

YOU CAN ALSO SEE on "Vic" the Full-Flow Elbows, Tees, and other Victaulic Fittings that make possible increased pipe-line delivery...at lower pumping costs! The long and easy sweeps of Victaulic Full-Flow Fittings are engineered for more efficient flow!

THERE'S ALSO the new "Vic-Groover"...it grooves pipe ends twice as fast with half the work of ordinary pipe threaders!

WRITE TODAY for Victaulic Catalog and Engineering Manual No. 44...and for the new "Vic-Groover" Catalog No. VG-47.



SELF-ALIGNING PIPE COUPLINGS

VICTAULIC

EFFICIENT FULL FLOW FITTINGS SIZES—3/4" THROUGH 60"

VICTAULIC COMPANY OF AMERICA

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Victaulic, Inc., 727 W. 7th St., Los Angeles 14, Calif.

Victaulic Company of Canada, Ltd., 200 Bay St., Toronto 1

For export outside U. S. and Canada: PIPECO Couplings and Fittings:

Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

Copyright 1948, by Victaulic Co. of America

Oil Industry Plan Set For Possible Shortages

A voluntary plan to assist the oil industry to meet possible shortages of oil and gasoline this winter became effective Aug. 11, following approval by Secretary of the Interior Krug. The plan, which will end Feb. 28, or earlier if Secretary Krug so acts, is similar to one hastily organized last winter and may be used when and if shortages develop. It provides anti-trust immunity to any organization complying with its provisions but does not apply to exports.

Under the plan, each member of the petroleum industry promises to "equitably distribute" his available supplies after supplying essential military, transportation and public health needs. The National Petroleum Council is authorized to appoint district committees, which may name subcommittees, to study supply and demand in their districts and make recommendations for voluntary action by the petroleum industry to adjust refinery yields and prevent or alleviate consumer hardships.

The plan also states that the agreement is necessary because it appears that in the latter half of 1948 and in early 1949 "the supply of petroleum products may be insufficient to satisfy the essential requirements of all domestic consumers."

Indicative of the industry's concern was a recent statement by B. E. Hull, vice president, The Texas Co., who reportedly said that if the Middle East oil field transport problems were not solved, gasoline rationing would be an accepted fact in the United States by 1951. He pointed out that during this year the U. S. had become an importer of oil instead of an exporter, and stressed the fact that for the past 22 years the U. S. had been a net oil exporting country. "It looks like this condition will continue for years," he said.

Meanwhile, *The Oil and Gas Journal* was reported to have stated that there would be no critical shortage of oil and gasoline during the coming winter and that supplies would be adequate for all normal needs.

Gas Turbine Lent to B.C.R. Locomotive Group

A large gas turbine once destined for Russia under lend-lease was to be made available to the Locomotive Development Committee of Bituminous Coal Research, Inc., for experimentation on the use of pulverized coal as a fuel for gas-turbine locomotives, under a cooperative agreement announced last month by the U. S. Bureau of Mines.

This 40,000-c.f.m. unit plus a 23,000-c.f.m. turbine was obtained by the Bureau from the WAA by the State Department. The smaller unit will be used in the Bureau's second under-

Rome 60

DRILL CORD

IS SAFE

BECAUSE...



- 1** It is jacketed with tough, *flame-resistant* Neoprene.*
- 2** Recommended three-conductor construction provides a safety grounding conductor.**
- 3** The reinforced Rome 60 jacket of Neoprene resists mechanical shock, abrasion, and is unaffected by immersion in acidulous mine waters.***

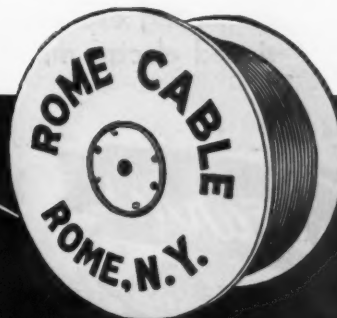
Meets State of Pennsylvania and Federal flame test requirements by wide margin.

Provides grounding features in accordance with all requirements of the new Mine Safety Code in addition to clear-cut polarity identification.

Also resistant to oils, alkalis, corrosive vapors and surface checking.

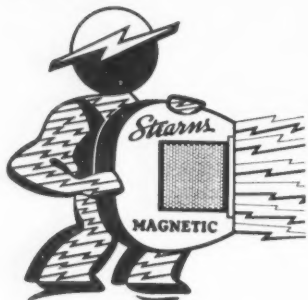
FROM BAR TO FINISHED WIRE

ROME CABLE
CORPORATION
ROME • NEW YORK



ELECTRO MAGNET VS PERMANENT MAGNET

Some Good Magnet Advice!



**Stearns
ELECTRO
MAGNET**

Don't fall for any "cure all" permanent magnet to solve your magnetic separation problems.

The old medicine man had a cure all for every ailment and many a gullible sucker fell for this sales technique and found the stuff he bought failed to produce results. So — don't be fooled by propaganda that permanent magnets are the solution to ALL your tramp iron troubles.

GOOD FOR
MAN OR
BEAST



**"PEPPO"
PERMANENT
MAGNET**

Some permanent magnets are good—BUT for limited magnetic separation problems. If you want consistent powerful and continuous magnetic strength for all kinds of magnetic separation, be smart, buy ELECTRICALLY energized magnets, magnets with guts. Don't buy a magnet that must be energized from an electric magnet. Buy the electro magnet in the first place.

Consult Stearns Magnetic. Fifty years of pioneering experience in making well designed electro magnetic separators.

Stearns



MAGNETIC MFG. CO.

**PULLEYS—DRUMS—ROLLS
CLUTCHES—BRAKES—MAGNETS**

661 So. 28th St., Milwaukee 4, Wis.

EQUIPMENT APPROVALS

Five approvals of permissible equipment were issued by the U. S. Bureau of Mines in July, as follows:

Joy Mfg. Co.—Type 11BU-10APG/H/T/N/U loading machine; two motors, 50 and 4 hp., 220 and 440/500/625 volts, a.c.; Approvals Nos. 2-626 and 2-626A, respectively; July 7.

Joy Mfg. Co.—Type 11BU-11BG/H loading machine; two motors, 50 and 4 hp., 220 and 440 volts, a.c.; Approvals Nos. 2-627 and 2-627A, respectively; July 13.

Joy Mfg. Co.—Type 8BU-13E rock loader; one 15-hp. motor, 250 volts, d.c.; Approval No. 2-628; July 14.

Mines Equipment Co.—Type PGGK distribution box; three branch circuits, 550 volts, a.c.; Approval No. 2-629A; July 15.

Mines Equipment Co.—Type PK junction box; one branch circuit, 550 volts, a.c.; Approval No. 2-630A; July 20.

ground coal gasification experiment at Gorgas, Ala.

Following the Locomotive Development Committee tests, which will be conducted at the committee's laboratory located in the Dunkirk, N. Y., plant of the American Locomotive Works, the gas turbine will be returned and the data obtained will be made available to the Bureau for use in its allied research on the production of synthetic liquid fuels from coal.

Large-scale operating tests on coal-handling and combustion equipment have been in progress for some months, at both Dunkirk and Fontana, Calif.

Injunction Sought to Halt Tax on Stripping Units

A. E. Dick Construction Co., Hazelton, Pa., early last month began Court action for an injunction to restrain the School District of Hazel Township from imposing taxes on stripping equipment. Under the resolution passed July 6, the district seeks to collect from the Dick company \$100 per cubic-yard capacity of all its shovels and draglines and \$1 per horsepower of all other equipment used for stripping within its limits. Following argument in Court, a temporary restraining order was issued as requested by the coal company, and a decision on a permanent order was slated for release later in the month.

Earlier, a report issued July 31 by the Pennsylvania Department of Internal Affairs indicated that Pennsylvania political sub-divisions were capitalizing on a large scale on the authority to tax coal production granted by the state law. Of 96

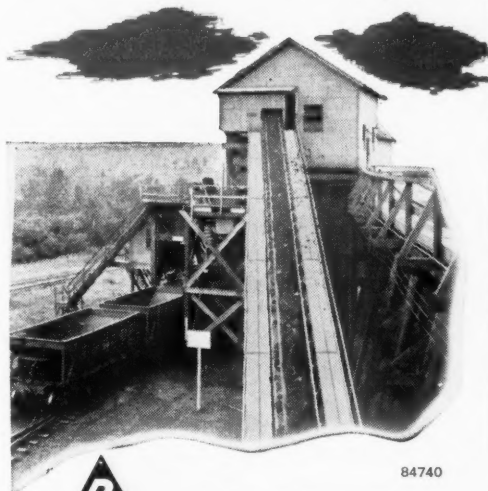
Barber Greene



● **LOW HEADROOM..HIGH EFFICIENCY CONVEYORS...**

Standardized

for easy assembly and relocation



You can cut the cost of getting the coal out of those low seams with simplified, "standardized" B-G channel-frame belt conveyors. These B-G pre-engineered underground conveyors come to you clearly marked for quick and easy assembly—are simply disassembled, relocated with a minimum loss of working time.

Rugged channel frame has skid legs for low head room mounting on the floor, holds smooth rolling B-G Carriers in true alignment . . . To cut costs now, why not see your B-G Distributor about these widely used mine conveyors?

(Left) Less assembly time, less "blue-print work"—B-G Mine Conveyors (Channel or Truss Frame) with complete accessories—carriers, take-ups, drives,

A-frames, etc.—are designed for maximum interchangeability, greatest ease in selection and erection. Assembly-tested at the factory!



BARBER • GREENE COMPANY, AURORA, ILLINOIS

Constant flow Equipment



LOADERS



PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



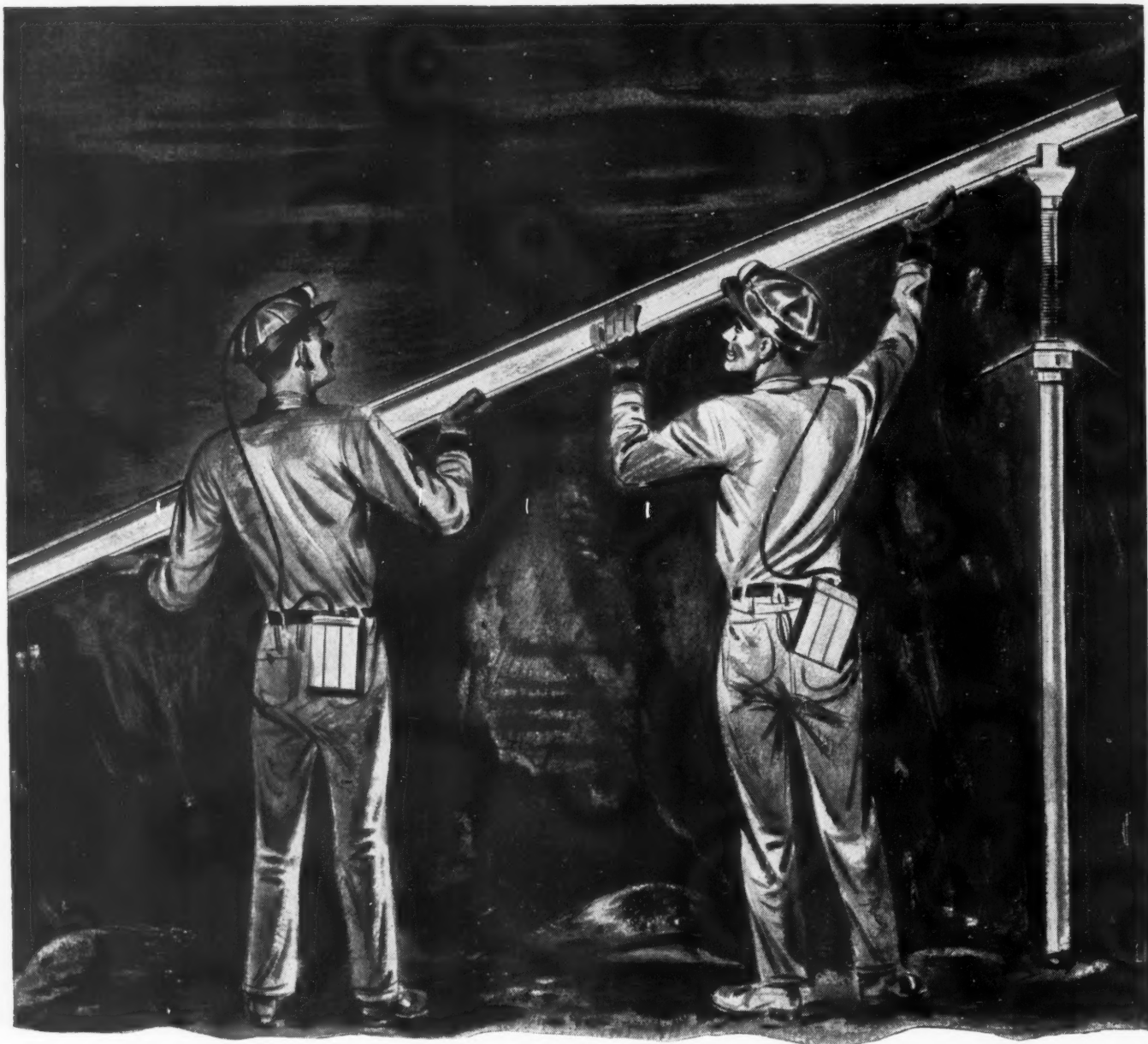
BITUMINOUS PLANTS



FINISHERS



DITCHERS



Alcoa Aluminum Roof Beams *save you time and money*

Light! Compact! Acid-resistant! Strong!

Your timbermen will like the ease of setting Alcoa Aluminum Roof Beams. Your miners will like the safety of working beneath them! You will like the low cost over the years of using and re-using Alcoa Aluminum Roof Beams.

They're light in weight. A 4-inch H-beam of aluminum weighs only 4.85 pounds per foot. Yet it has the strength to support your working-face roofs over long spans. Compact, they save as much as 2" of working height over wood beams.

Alcoa Aluminum Alloy 61S-T6 beams are impervious to fungus and rot, resist the acids in mine water.

Although immediate delivery is not possible in all cases, due to the current metal shortage, you can lay your plans for future light-weight timbering. Figure now on reducing timber weights and production costs.

Ask your mine supply house for Alcoa Aluminum Roof Beams. Or write to ALUMINUM COMPANY OF AMERICA, 1763 Gulf Building, Pittsburgh 19, Penna. Sales offices in 54 leading cities.

ALCOA ALUMINUM



boro
trict
37 r
and
At
Wes
actic
all c
for
proc
pose
sche
cilm
tap
coal
the
of t

Per
To

R
ing
ing
Bea
Pen
prov
miss
on i
lie
man
had
that
in

U
din
min
tria
zon
com
cou
firs
wo
ship
I
be
and
pos
com
set
ma
The
tha
ed
the

• A
1,0
ple
Tre
tav
kn
Ho
Al

to
of
our
by
an
N.
Co
cor
an

CO

boroughs, townships and school districts surveyed by the department, 37 reportedly had taxed coal mining and processing from 2 to 10c. per ton.

At a regular meeting Aug. 13, the West Wyoming (Pa.) Council began action to place a tax of 5c. a ton on all coal mined, removed or prepared for market in the borough, with the proceeds to be used for general purposes. Final action on the tax is scheduled for Oct. 8. Several councilmen maintained that the tax should tap all industries in the town, and not coal alone, but no steps were taken at the meeting to broaden the scope of the tax.

Pennsylvania Townships To Limit Stripping

Regulations subjecting strip mining to zoning restrictions and requiring leveling of soil by Canfield and Beaver Townships, Mahoning County, Pennsylvania, last month were approved by the county planning commission. The ordinances will be voted on in the fall, following another public hearing. Austintown and Boardman zoning commissions reportedly had previously proposed ordinances that would prohibit strip mining within their boundaries.

Under the Canfield and Beaver ordinances proposed, existing strip mines are to be classified as industrial property and other property zoned as agricultural, residential and commercial. No agricultural land could be leased for stripping without first obtaining a zone change that would require application to township trustees and a public hearing.

In addition to requiring that land be restored to its original contour and ground filled in to replace deposits mined within 90 days after completion of mining, the ordinances set up limits on how close stripping may go to roads, other property, etc. The Canfield proposal also requires that the land be reseeded or reforested within a reasonable time and at the discretion of the zoning inspector.

New Developments

- A new tippie with a capacity of 1,000 tons a shift has just been completed and put into operation by the Troy N. Beaver Coal, Inc., Punxsutawney, Pa. The new plant, to be known as Beaver No. 2, is located at Hooker, Pa., and is on the Western Allegheny R.R.

"The new tippie has been designed to help us meet over-all requirements of the future market. It supplements our facilities at Beaver No. 1, Kaylor, by adding screening to our picking and crushing facilities," stated Troy N. Beaver, president of the company. Coals from eight pits feed into the company's Kaylor and Hooker tippies and are blended to meet specific

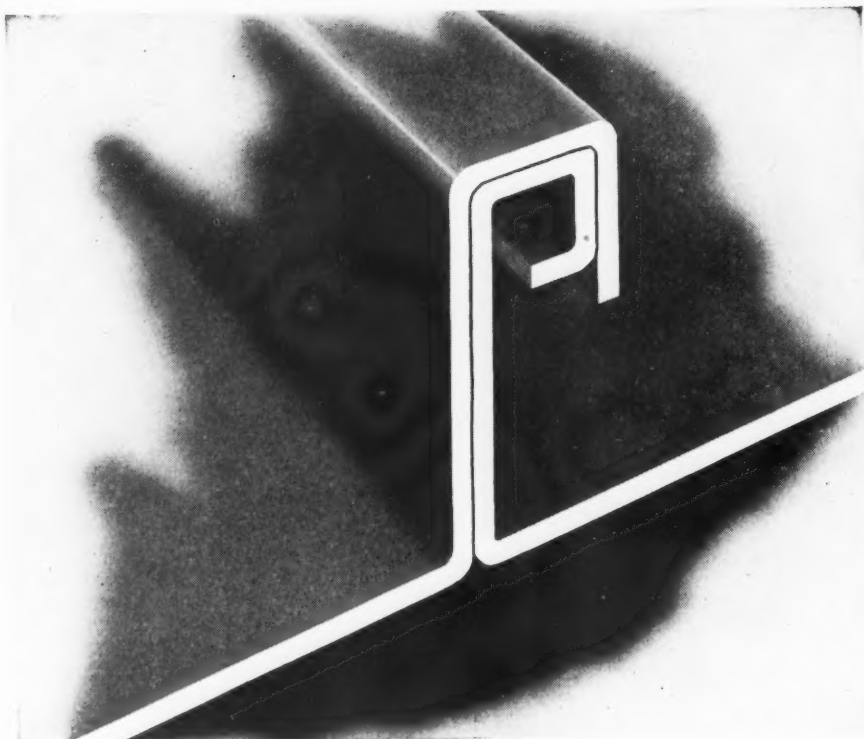
7 YEARS DEVELOPMENT

ON FIELD TESTS IN EVERY TYPE OF PROSPECTING AND STRIPPING THROUGHOUT THE WORLD.



The Parmanco Single Speed Transmission Drill is designed to meet the requirements of the general prospecting field where it is not necessary to drill in solid limestone. Special sliding frame permits drilling and pulling of augers without moving drill. New design of chuck eliminates all hand operation in raising power plant. Recommended for 50 to 60 feet with four and one-half inch equipment. Under favorable conditions it is being used to greater depths.

PARIS MANUFACTURING COMPANY
PARIS, ILLINOIS



This Joint Gives Buildings "Old Age Benefits"

Here is simple, low-cost insurance against the time when ordinary buildings begin to sag and show their age. The patented, Armco joint withstands expansion, contraction and unequal settlement. It keeps Standard STEELOX Buildings trim and youthful.

You'll also reap immediate benefits. With the revolutionary STEELOX method, the jointed panels provide both structural support and a finished surface. Erection is simplified, appearance improved and weathertight construction assured. Unskilled workmen quickly join the panels into a sturdy, maintenance-free structure.

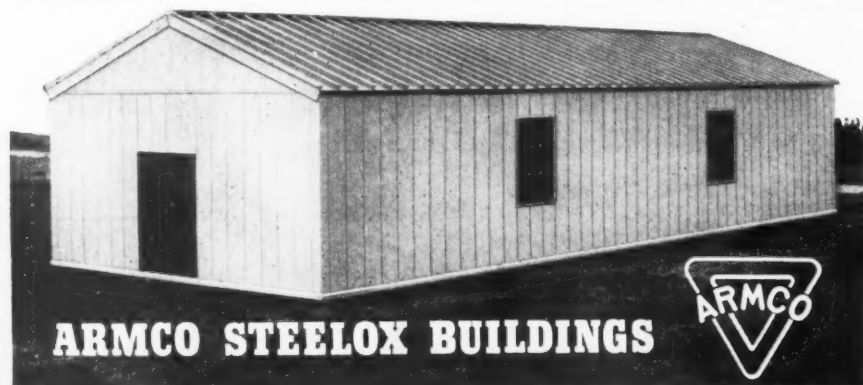
There are other advantages in

using STEELOX Buildings. They are made of Galvanized ARMCO PAINTGRIP Steel and can be painted immediately or left unpainted. STEELOX Buildings have the long life and low upkeep of a permanent structure, yet when necessary they can be quickly dismantled and re-erected at another site without loss of material. All parts are uniformly strong and the all-steel construction is an excellent fire-barrier.

STEELOX Buildings are prefabricated in a wide range of standard sizes to meet your requirements. Write for complete data. Armco Drainage & Metal Products, Inc., 2385 Curtis Street, Middletown, Ohio.

Check list for STEELOX Buildings

- | | | | |
|----------------|----------------|---------------|---------------------|
| ✓ Scale Houses | ✓ Time Offices | ✓ Cap Storage | ✓ Blower Houses |
| ✓ Tool Houses | ✓ Garages | ✓ Head Houses | ✓ Engine Houses |
| ✓ Washrooms | ✓ Lamp Houses | ✓ Pump Houses | ✓ Utility Buildings |



ARMCO STEELOX BUILDINGS

orders. The company has more than 16,000 acres under lease and operates another tippie at Montgomery, Pa.

- Purchase of the Hardburly mine of the Hardy-Burlingham Mining Co., at Hardburly, Perry County, Ky., by the Midland Mining Co., has been reported. Production from the mine, which mines the Hazard No. 7 seam, will be sold exclusively through the Midland Coal Corp., Cincinnati.

- Operating management of the Salem Hill colliery, Haddock Mining Co., Pottsville, Pa., has been taken over by the Locust Coal Co., a subsidiary of Weston Dodson & Co., Inc., sales agents for Haddock for several years. No immediate changes in operating policy or personnel are expected and ownership of the colliery continues under the Haddock company. About 100 men are employed at the breaker and mine. Daily capacity of the breaker is 500 tons, including coal purchased from other mines for processing.

- The Illinois Commerce Commission has authorized the Chicago, Burlington & Quincy R. R. Co. to construct a spur track at grade across six highways near Astoria, Fulton County, Ill., to serve a new stripping operation of the Sinclair Coal Co. Production at the new mine is scheduled for the immediate future at the rate of 500,000 tons annually.

- Plans for the opening of a new deep mine $\frac{3}{4}$ of a mile from its present Monarch mine have recently been announced by the Sheridan-Wyoming Coal Co., Inc., Monarch, Wyo. Production at the new site is expected to begin soon and the single spur track now being constructed will probably be expanded to two tracks, it was reported. The mine will produce a higher grade of coal than has been mined at Monarch in the past, it is understood. The company's Monarch mine is expected to be worked out in about a year and a half.

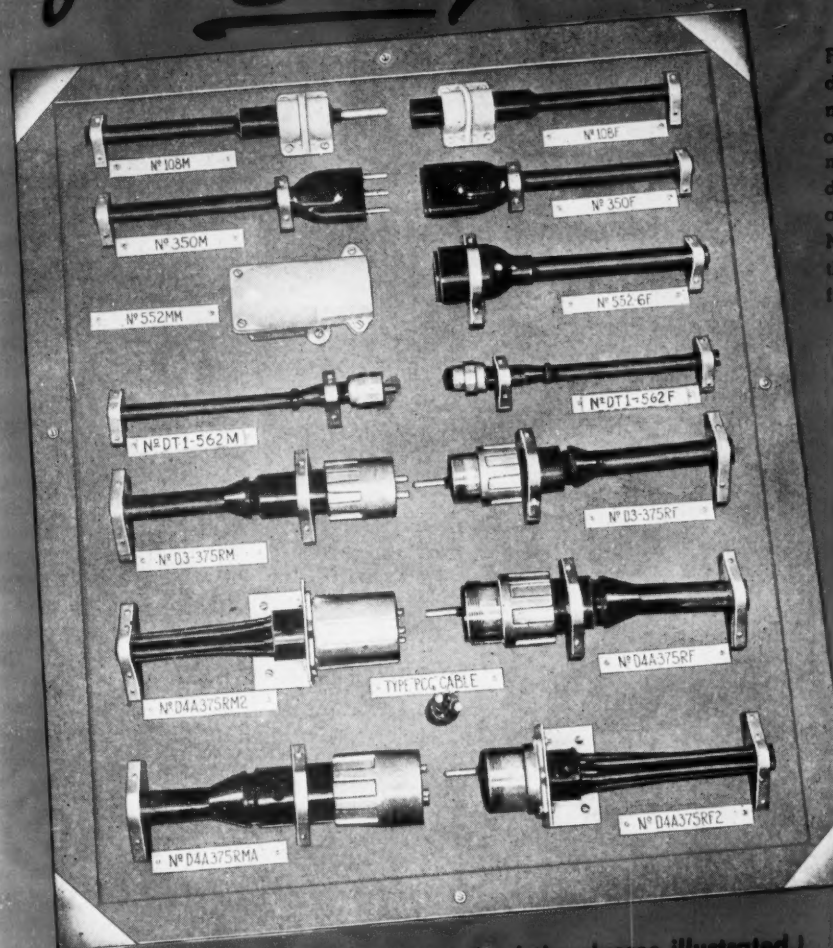
- The Bowie Coal Co., Grove City, Pa., has reportedly acquired 2,200 acres of coal land in Venango County, Pennsylvania, and plans opening of a large-scale stripping operation in the near future.

- Sale of the Rachel, W. Va., mine of the Jamison Coal & Coke Co. to the Sharon Steel Corp., previously reported in progress, was completed early last month. Acquisition of the property, it is understood, will enable Sharon to develop acreage it secured last January with the purchase of the Domestic Coke Corp., Fairmont.

- The Barking, Pa., property of the Hillman Coal & Coke Co., Pittsburgh, has been acquired by the Consumers Mining Co., Wheeling, W. Va., according to reports.

- A. J. Dalton, Pikeville, Ky., is understood to be planning construction of

Electrical Connectors for Every MINING NEED!



(Full range of sizes available in each of the classes illustrated.)

Nos. 108M and 108F-600 or 5000 volt single conductor class Connectors for cable sizes #10 to 4/0.

Nos. 350M and 350F-220/440 volt, 3 phase ungrounded connectors for cable sizes #14 to #2. Four Conductor, available as standard.

Nos. 552MM and 552-6F - applicable to D C reversing duty on conveyor control circuits, for cable sizes #8 to #4 with 6 Conductors.

Nos. DT1-562M and DT1-562F-600 volt straight pin "Bigus" swivel coupling class Connectors, for cable sizes #1 to 1000MCM.

Nos. D3-375RM and D3-375RF-600 volt straight pin (S. P. B. Bigus) swivel coupling class Connectors, for type W cable. Reverse ground contact cable sizes #12 to 250 MCM.

Nos. D4A375RM2 and D4A375RF - same as D3-375RM except with continuous pilot control circuit, for use on P.C.G. type cable, illustrated on panel. Are permissible when used with MINES Safety Circuit Centers. For cable sizes #12 to 4/0.

Nos. D4A375RMA and D4A375RF2 - same as No. D4A375RM2 except with shorted pilot control circuit. Are permissible when used with MINES Safety Circuit Centers. Cable size #12 to 250 MCM.

For more than twenty years MINES has been designing and manufacturing Molded Rubber Connectors for America's Mining needs. Today no other line so completely covers all mining requirements. Models illustrated on panel, and briefly described below, are only a few of hundreds available for standard applications. Molded of Neoprene to cable as integral units, (see below) they are ruggedly built to provide long, trouble-free service.

CHECK THESE OUTSTANDING FEATURES

✓ MOLDED NEOPRENE RUBBER BODY

All MINES Connectors are molded of oil, wear and flame resistant Neoprene. They won't crack when dropped or shatter when run over.

✓ WATER-TIGHT WHEN CONNECTED

When inter-connected MINES Plugs and Receptacles seal vital contacts in a resilient Neoprene housing—moisture, oil or dust infiltration is prevented. Thus minimizing replacement costs by insuring longer low-contact resistance.

✓ CONNECTOR INTEGRALLY MOLDED TO CABLE

Vulcanized as a unit to cable, MINES Connectors are molded with long tapered necks that make them extra-strong at the vital cable-connector junction.

✓ SOLID MALE CONTACT PINS

Accurately machined in one piece, from low resistant rod material, male pins in MINES Connectors have no split ends to collect dust or increase resistance.

✓ SPRING LOADED FEMALE SOCKETS

Female sockets in MINES Connectors are spring loaded and ring encased—to automatically compensate for wear and insure a long life of low contact resistance.

✓ BALL BEARING COUPLINGS

MINES S. P. B. Straight Pin Bigus Connectors, (bottom eight connectors on panel) are equipped with threaded "fire-hydrant" Swivel type, metal couplings for ease in connecting, and to prevent accidental disconnects. Larger sizes revolve on ball bearings. Coupling parts may be renewed separately if damaged.

Consult a Joy Engineer

CONSULT A JOY ENGINEER... or your nearest Joy Office for further information on complete Connector line.

SALES AND SERVICE TO THE MINING INDUSTRY BY
JOY MANUFACTURING COMPANY
HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

MANUFACTURED BY
MINES EQUIPMENT COMPANY

4229 CLAYTON AVE.



ST. LOUIS 10, MO.

North • East • South • West . . . It's Schramm



...doing jobs like these in Your Field ↘

At almost every turn you need compressed air!

The check list (at right) indicates some of the many compressed air jobs to be done, all of which are accomplished easily, quickly and economically with Schramm Air Compressors.

Here's *why* you profit, as others have, by using Schramm: they're compact, lightweight, easy to start; built for rugged jobs, to provide a continuous flow of air.

Important features include 100% water cooled; mechanical intake valve; forced feed lubrication and easy, electric push-button starting.

Performance everywhere has proved Schramm Air Compressors can do any compressed air job you require. Write today for list of models and sizes.

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

Rock Drilling
Breaking Pavement
Trench Digging
Clay Spading
Sheet Pile Driving
Backfill Tamping
Caulking Pipe Lines
Spray Painting
Sand Blasting
Digging Post Holes
Pneumatic Grease Guns
Pneumatic Tools
Spraying Metal
Spraying Enamel
Riveting
Steel Drilling
Wood Boring
Scaling
Chipping
Caulking Boilers
Cleaning Boiler Flues
Cleaning Engine Generators
Operating Air Hoists

a coal-preparation plant to clean 40 to 50 railroad cars of coal daily. Mr. Dalton, who owns about 60 truck mines in the Pikeville area and handles shipments from a number of other truck operations, is planning the erection of additional plants in the county, it is reported.

• Construction of a road to facilitate haulage of new machinery and supplies is nearing completion at the LDS coal mine north of Castle Dale, Utah, operated by the Mormon Church interests. The main road to the mine also is being improved to facilitate coal haulage by trucks. A new loading machine recently was delivered to the mine and a new cutting machine is on order, with the diesel electric unit recently obtained supplying power until the power company connection is completed this fall. A production of 200 tons daily is planned for the operation.

• Satisfactory progress has been reported in financing arrangements for the Ford Highwood Collieries Ltd., which is planning to develop a property about 60 miles southwest of Calgary, Alberta, Canada. Proceeds of the proposed bond issue are to be used in building a 50-mile railroad and in development of the mine. According to reports, coal from the property has been under actual test in the northwest United States and as a result of the tests no difficulty is expected in finding a market in that locality. Arrangements are under way to bring stripping equipment to the property. The 50-mile rail line reportedly will join the Canadian Pacific Ry. near Okotoks, Alberta.

• The sale of the Choate Coal Co., operating a mine near Marion, Ill., by Homer H. Choate to Lallie and Roy Corder was reported last month. The mine was opened in 1946 with a capacity of 200 tons a day.

Slate Fall on Man-Trip Kills Five W. Va. Miners

Five men were killed and eight others hurt about 1 a.m. Aug 6 when a slate estimated as weighing 16 tons fell on two cars of an outgoing man-trip at the No. 11 mine of the New River & Pocahontas Consolidated Coal Co., Capels, W. Va. About 45 miners reportedly were in the cars and the fall, which was said to be about 25 ft. long and 18 in. thick, struck around the middle of the 25-car trip. Two other man-trips had passed the spot a few minutes earlier without incident. The fall occurred 340 ft. underground and 8,500 ft. in from the bottom of the shaft.

Following an all-day investigation of the accident, E. L. Chatfield, West Virginia inspector-at-large, reported that there was no evidence of company negligence and that no hearing would be necessary.

*For fast and thorough
clean up on both . . .*

HIGH COAL

a n d

L O W C O A L



THE CLARKSON
Redbird

Get the details for your operation

TYPE 24 BB
UNIVERSAL LOADER

The **CLARKSON**
MANUFACTURING CO.
Nashville
Illinois



This Biggest-Selling Permissible

**helps get out more
big lump coal—faster**

BECAUSE so many coal mine operators prefer "Monobel" AA and use it exclusively, it has now become Du Pont's biggest selling permissible. It's an ideal coal-getter . . . producing big lump coal by the carload.

Miners approve the slow, heaving action of "Monobel" AA. It puts the coal where mechanical loaders can easily get at it. It delivers high percentage recovery.

"Monobel" AA is a water-resistant permissible used efficiently even in the wettest mines. It does the right kind of job in high, hard-shooting seams and in ordinary rock or slate work. Shears ribs and face clean and square, whether top or bottom cut-

ting is practiced. Fumes are Class A . . . speeding return to the working place.

Try "Monobel" AA. We think you'll agree with many miners who say it's a permissible that really helps get out

more coal—faster. Many also find it eliminates the need for several permissibles. Any Du Pont Explosives representative will give you complete information about this popular coal-getter.

E. I. du PONT de NEMOURS & Co. (INC.)
Explosives Department Wilmington 98, Delaware

DU PONT PERMISSIBLES

Blasting Supplies and Accessories



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Plans Announced for Indiana Coal Conference

The annual Indiana Coal Conference, sponsored by the Indiana Coal preparation and Utilization Society and the Ohio Valley Section, A.I.M.E., is to be held in Terre Haute, Ind., Friday and Saturday, Sept. 24-25, C. C. Lydick, secretary of the Indiana Society, announced last month.

Seven men prominent in the industry are slated to speak on the all-day program Sept. 24, with the second day devoted to an inspection trip to a shaft mine, tippie and strip operation near Terre Haute.

The conference last year drew an attendance of more than 200, and a group of that size or larger is expected at this year's meeting.

Coal Export Quotas Discontinued Sept. 1

Allocations of coal for export overseas, in effect since 1944, were to be discontinued Sept. 1, according to an announcement early last month by Charles Sawyer, Secretary of Commerce.

Greater production by American mines, together with a decline in overseas demand for American coal because of increased European production, were cited as reasons for dropping the quota system. Export licenses for overseas shipment of coal are still required, however.

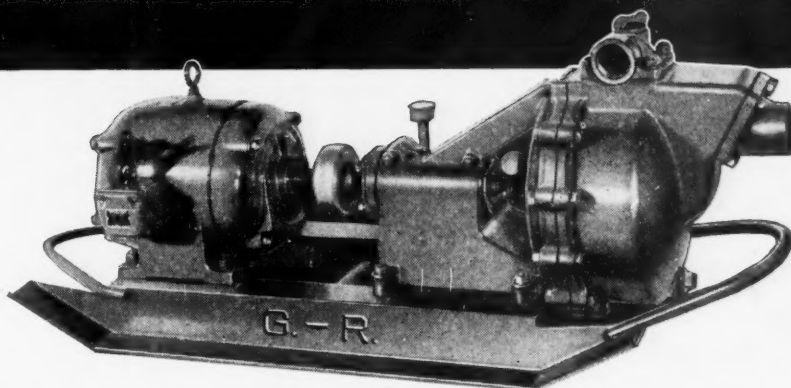
Compensation Rates Cut In Pennsylvania

A reduction of 5 percent in workmen's compensation rates for anthracite, bituminous and strip mining was announced July 21 by Pennsylvania Insurance Commissioner James F. Malone Jr. The new rates became effective July 1.

Miner Sent to Jail For Carrying Matches

Frank Konopka, Avoca, Pa., a miner of 17 years' experience, became the first miner to be sent to jail in a recent crusade against smoking and match-carrying in mines in the area, when he was sentenced last month to serve 30 days in a county prison after being found guilty on three charges of violating the Pennsylvania Anthracite Mining Code. Matches he was carrying illegally reportedly set off a minor explosion April 28 in the No. 1 shaft of No. 9 colliery, Hughestown, Pa., and resulted in serious burns on his right hand and minor injuries to three other workers. Fourteen other defendants brought before the county court on similar charges recently have been let off with warnings and stiff fines ranging up to \$100.

LOW HEADROOM? *Simply Specify* GORMAN-RUPP PUMPS



A LOT OF PUMP IN A SMALL SPACE

These husky, self-priming, centrifugal mine gathering pumps will handle large quantities of water yet take unbelievably small headroom - from 13½" to 21¼", depending upon size. (pump only)

Ideal for remote locations and automatic operation - requiring little or no attention, operating 24 hours a day, continuously, day after day without shut-down.

Positive and powerful self-priming. No adjustments required between prime and run - start the motor and you start the water.

Sand, muck or solids that will pass the intake strainer WILL NOT CLOG or harm a Gorman-Rupp.

Absolute Simplicity - only one moving part, the impeller - no reduction gears or valves. All wearing parts can be quickly replaced by an inexperienced man with common tools.

You can't beat a Gorman-Rupp for dependability and performance. Available in capacities from 50 to 200 GPM and heads up to 125 feet. Write today for special mine bulletin showing some interesting actual installations, or contact your nearest distributor.

Check this list -

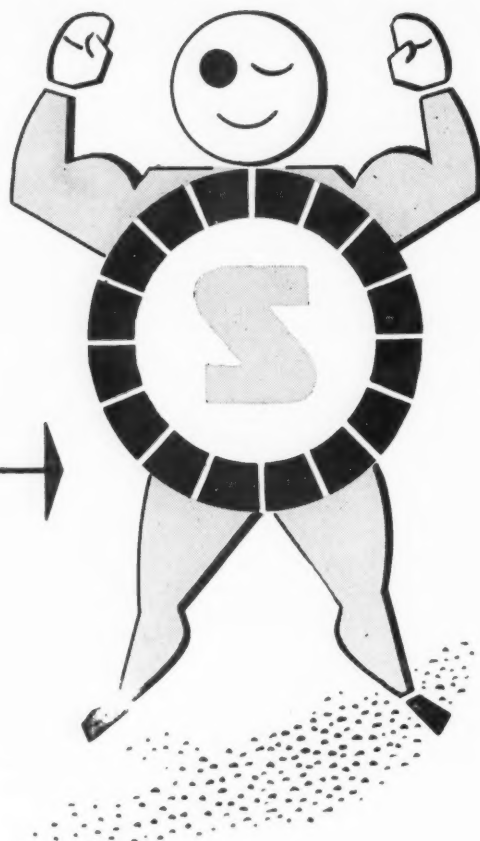
FOR YOUR NEAREST GORMAN-RUPP DISTRIBUTOR

Guyan Machinery Company.....Logan, W. Va.
Weinman Pump & Supply Co.....Pittsburgh, Pa.
McComb Supply Company.....Harlan, Ky.
Bittenbender Company.....Scranton, Pa.
Industrial Supply Co.....Terre Haute, Ind.
Hoe Supply Company.....Christopher, Ill.
Greenville Supply Co.....Greenville, Ky.
General Machinery Co.....Birmingham, Ala.
Superior Sterling Co.....Bluefield, W. Va.
Athens Armature & Machinery Co....Athens, Ohio
Tennessee Mill & Mine Supply Co...Knoxville, Tenn.
Mine Service Company.....Lothair, Ky.
Reliable Electric & Equip. Co.....Zanesville, Ohio
Cambridge Machinery & Supply Co...Cambridge, O.
Sackett Electric Corp.....Columbus, Ohio

THE  **GORMAN-RUPP COMPANY**
MANSFIELD, OHIO

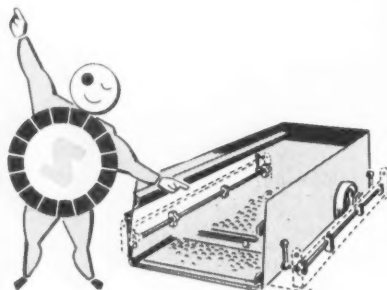
Let
SECO

solve your
vibrating
screen
problem



**GET THIS EXCLUSIVE
FULLY CONTROLLED TRUE
CIRCULAR ACTION**

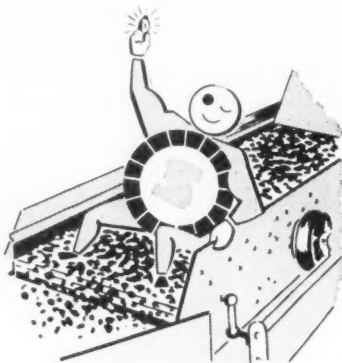
Whether your screening of coal is in connection with mining or stripping operations, you'll benefit by Seco's smooth, trouble-free performance. Seco's patented Equalizer Assembly (in outline) controls the action of the screen body with resultant true circular action under all load conditions.



**THIS IS WHY YOU
CAN SCREEN MORE TONS
PER HOUR WITH A SECO**

The smooth action of a Seco keeps the coal moving, reduces blinding and plugging of the meshes and by so doing—increases tonnages. Thousands of enthusiastic Seco users coast to coast have proven this. There's a right Seco for your screening job, too!

Write Dept. CA for A Guide to Better Screening



Write for A Guide to Better Screening

Dept. C A

SECO

**SCREEN EQUIPMENT COMPANY, INC.
PRODUCERS OF VIBRATING SCREENS EXCLUSIVELY**

Buffalo 21, New York

In Canada: United Steel Corp., Ltd., Toronto

**Coal Loses Lead
To Oil and Gas**

Coal no longer holds its dominant position as a source of energy, having lost ground to other fuels in industry and in home heating, the Department of Commerce declared July 26. On a per capita basis, use of natural gas has increased almost 80 percent since 1939 and oil about 60 percent, the department stated. Bituminous consumption has increased 25 percent in the same period but anthracite consumption is down 15 percent. Pointing to the high rate of current industrial activity, including railroad traffic and steel and power output, as the reason for present high rates of bituminous consumption, the department said that coal has lost ground in industry and cited the fact that coal now provides only about two-thirds of all railroad fuel against about four-fifths in 1939.

**Utah Company Awards
University Scholarship**

A four-year university scholarship offered by the United States Fuel Co., Salt Lake City, Utah, has been awarded to Reid A. Leamaster, Huntington, Utah. Mr. Leamaster's father, Delbert Leamaster, deceased, was mine foreman of the company's King mine for a number of years. The scholarship winner was selected by the fellowship and scholarship committee, University of Utah, on the basis of academic records, aptitude tests, character and personal traits. Mr. Leamaster has elected to spend his first two years of study at Carbon College, Prince, and his last two years at the state university.

**Illinois Scholarship
Set-Up Clarified**

To clarify the present status of coal-mining scholarships in colleges and universities in Illinois, B. E. Schonthal, secretary-treasurer, Illinois Mining Institute, has submitted the following information:

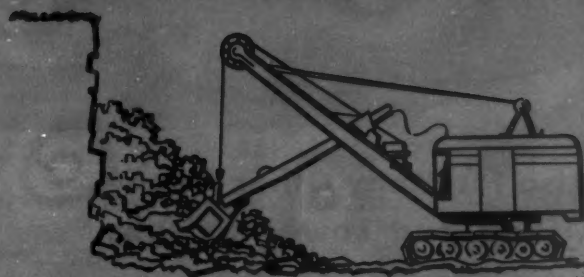
The Illinois Mining Institute at present has two scholarships in force, one held by a freshman and the other by a sophomore. The Peabody Coal Co. has four scholarships in force, held by two freshmen and two sophomores. The Old Ben Coal Corp. has awarded two scholarships to freshmen now in college. In addition, Central Mine Supply, Mt. Vernon, Ill., has granted a scholarship to one freshman in college this year.

When the scholarship system reaches full postwar reinstatement, the Illinois Mining Institute will have one student in each of the four years of the college course and the coal companies will have two students in each of the four years. The scholarship offered by Central Mine Supply

**LESS
VIBRATION**



**BETTER
FRAGMENTATION**



**WITH NO-VENT* SHORT-PERIOD DELAY
ELECTRIC BLASTING CAPS**

Progressive detonation is what you get with Hercules No-Vent short-period delay electric caps. The results are better fragmentation, reduced back break, plus less vibration with fewer complaints resulting from it.

Hercules short-period delays are manufactured under controlled conditions giving dependability in quarry shooting and many other types of blasting.

HERCULES POWDER COMPANY

INCORPORATED

936 King Street, Wilmington 99, Del.



*REG. U. S. PAT. OFF.

FOR *Fast* RERAILING OF MINE CARS

DUFF-NORTON

*Automatic
Lowering
JACKS*



514-MT

Also for Many Other Heavy Lifting and Lowering Jobs

Rerailing of mine locomotives and cars, bracing of cutting and loading machines, maintenance of track and general shop repair work—are some of the unlimited uses of the Duff-Norton 5 ton Automatic Lowering Jack illustrated above. Your mine should have several of these handy jacks available for all emergency and regular repair jobs.

DUFF-NORTON MINE ROOF JACKS

For Cross Timbering-Mine Roof Support and Protection of Working Face Areas

Duff-Norton Mine Roof Jacks are designed and built for quick, easy and safe operation. Heavy rigid center columns insure full capacity and complete safety. They serve as sturdy supports until permanent timbering is in place. Write for complete data.



See Your Local Industrial Distributor

THE DUFF-NORTON MANUFACTURING CO.

"The House that Jacks Built" • PITTSBURGH 30, PA.

THE WORLD'S OLDEST AND LARGEST MANUFACTURER OF LIFTING JACKS

is on a year-to-year basis. All awards are for \$200. Scholarship winners are given summer work at the mines as far as possible.

Anthratube Output To Be Stepped Up

With production of 300 to 400 units per month by mid-August predicted by the Bethlehem Foundry & Machine Co., Bethlehem, Pa., prospects of meeting demands for Anthratube home-heating burners as the heating season approaches are considerably brighter, according to a recent announcement by the Anthracite Institute. The Bethlehem plant already is tooled up and the first 100 units have been turned out, declared C. S. Dieter, Bethlehem vice president in charge of sales.

The Bethlehem Anthratube incorporates the basic features of the Anthracite Institute design plus additional refinements that include delivery with complete electrical assembly and steel jacket. Only two simple electrical connections to the household system are needed, it is reported.

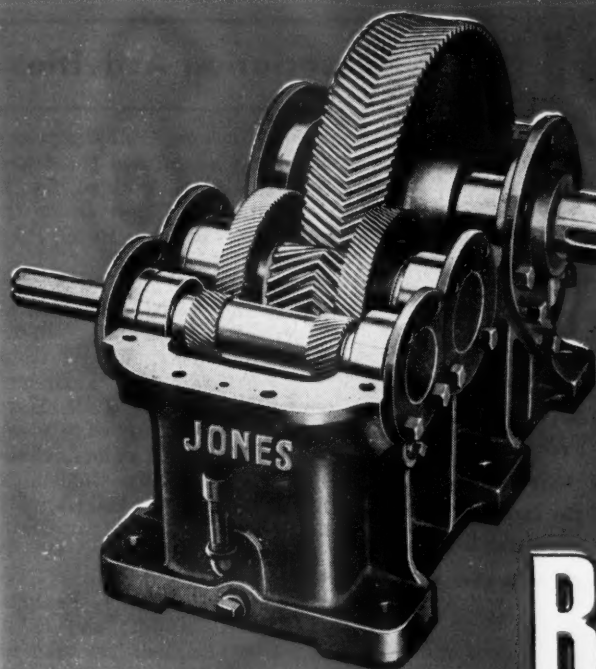
Entry of the Bethlehem Foundry & Machine Co. into the Anthratube-manufacturing field adds another organization to the list of those already fabricating the units, including the Axeman-Anderson Co., Williamsport, Pa., which recently expanded production facilities to boost output from 100 to 400 units per month, and the American Boiler Works, Erie, Pa.

New Diesel-Fuel Source Predicted in Illinois

A new source of diesel fuel may lie in Illinois coal beds, according to A. D. Singh, president, Singh Coal Co., Chicago, who recently authorized plans for a processing pilot plant to handle a ton of coal daily. The Illinois Coal Products Commission, a state agency, has approved \$16,000 for the project in addition to some \$36,000 already spent. It is predicted that 40 gal. of liquid fuel can be produced from each ton of coal and that briquets can be made from the fine char by-product.

Mine Blast Kills 13, Injures 4 Others

Thirteen miners were killed and four others were injured, two of them critically, in an explosion July 27 in the Kings Station mine, Princeton Mining Co., Princeton, Ind. Company officials said there were 176 men working in the mine at the time of the blast but only one loading unit of about 20 men was affected. A small fire resulting from the explosion was extinguished quickly.

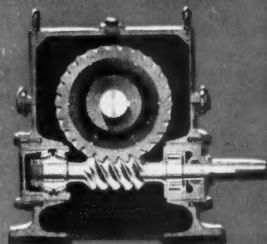


Your kind of...

SPEED REDUCERS

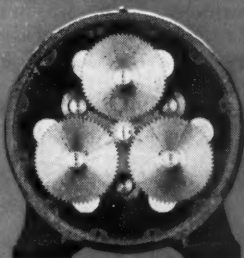
HERRINGBONE REDUCERS

Ratios $1\frac{1}{4}$ to 1 up to 300 to 1 in capacities from 1 to 400 H.P.



WORM GEAR REDUCERS

Ratios 4 to 1 up to 90 to 1 in capacities from $\frac{1}{4}$ to 100 H.P.



SPUR GEAR REDUCERS

Ratios $5\frac{1}{3}$ to 1 up to 200 to 1 in capacities from $\frac{1}{2}$ to 75 H.P.

Jones

When you want a speed reducer you want the type that will best handle your particular drive problem . . . and you want a reducer that will "stand the gaff." Jones reducers measure up to both of these standards.

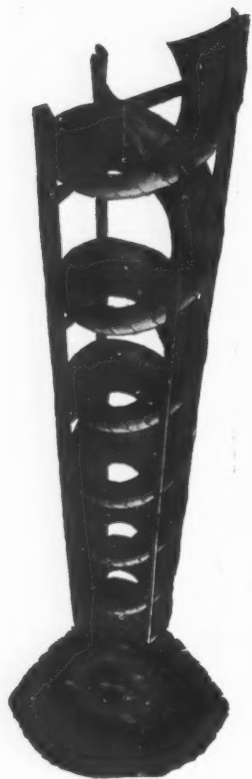
It makes no difference whether you require herringbone, spur or worm gear reducers, the Jones organization can give you just what you need in any ratio and capacity . . . and over the years Jones reducers have shown the ability to "take it" under the most severe operating conditions.

Jones offers your kind of speed reducers to solve your kind of drive problems.

W. A. JONES FOUNDRY & MACHINE CO.

4401 Roosevelt Road, Chicago 24, Ill.

HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS
PULLEYS • GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • FLEXIBLE COUPLINGS



... AVOID BREAKAGE

The advantage of Holmes' spiral over previous chutes of this nature lies in the design of the carrying surface, which is formed much as the bowl of a race-track, having no retaining wall on the inside edge. Elimination of this inside edge allows the material to slide gently onto the peak of the pile without droppage. By the same token, the peak of the pile may be carried around the interior of the bin in such a manner that the material is deposited in overlapping layers, where the problem of segregation is present.

ROBERT HOLMES AND BROS.
BINS - GATES - LOWERING SPIRALS - DUST-O-LATORS - SHAKING GATES
DANVILLE, ILLINOIS

With the advent of scientific consumption of coal and the increased demand for a clean, sized product, much study was given to methods by which so fragile a commodity might be handled into bins and silos without excessive degradation. This problem was solved by using lowering spirals designed to take the material from the conveyor and carry it gently to the bottom of the bin.

Design is such that the lowering speed of the material is automatically retarded when it begins to exceed a safe limit. Regardless of the distance the material travels, its velocity remains uniform; and it reaches the bottom in a continuous, even stream.

Spirals are available with the carrying surface covered to form a spiral tube for lowering above bin enclosure and thus give weather protection.



Coal Bunker Storage

Association Activities

Big Sandy-Elkhorn Coal Operators' Association has announced the transfer of its offices from Ashland, Ky., to its new specially built quarters on the lobby floor of the Hatcher Hotel, Pikeville, Ky.

At the annual meeting of the association, held July 2 in Lexington, all officers were re-elected, as follows: B. F. Reed, president; W. W. Goldsmith, vice president; H. S. Homan, executive secretary; and J. R. Hurt, treasurer. The following were elected directors: Harry LaViers, chairman; H. K. English; Mr. Goldsmith; A. P. Boxley; Joseph Harris; Mr. Reed; S. M. Cassidy; Edgar Dale; R. D. Davis; A. M. Ayers; V. D. Picklesimer; J. E. Bowman; G. O. Tarleton; W. F. Pioch; D. L. Francis; Mr. Hurt; A. H. Mandt; and R. A. Hedland. T. W. English has been retained as labor adviser.

Luncheon at the Lexington County Club followed the business session in the morning, at which Joseph E. Moody, president, Southern Coal Producers' Association, addressed the group. The afternoon was devoted to sports and in the evening members and guests assembled at the Lafayette Hotel for the annual banquet.

Smoke Prevention Association of America, Inc., at its 41st annual meeting in New York, June 7-10, elected the following officers: president, William G. Christy, smoke abatement engineer, Hudson County, Jersey City, N. J.; first vice president, W. E. E. Koepler, Pocahontas Operators' Association, Bluefield, W. Va.; second vice president, A. A. Raymond, New York Central R. R., Buffalo, N. Y.; secretary-treasurer, Frank A. Chambers, chief smoke inspector, Chicago, Ill.; sergeant-at-arms, Thomas P. Scully, C. W. P. & Southern Ry., Chicago, Ill.; public relations director, D. A. Sullivan, engineer, Commonwealth Edison Co., Chicago, Ill.

Preparation Facilities

Blue Diamond Coal Co., Leatherwood, Ky.—Contract closed with Roberts & Schaefer Co. for coal washery to clean run-of-mine at 700 t.p.h., of which 600 tons is to be mechanically cleaned; washing unit to be Jeffrey Baum jig, with Bird dryers and water clarification, flash-drying system for heat drying of fine coal, refuse-disposal system and a 700-ft. bridge spanning valley for tram road serving entire acreage.

Stevens Coal Co., Zerby colliery, Shamokin, Pa.—Contract closed with Wilmot Engineering Co. for one 12-ft.-diameter Hydrotator to prepare

Wilmot Introduces New HYDROTATOR FOR CLEANING LARGE SIZES of Anthracite

This announcement of Wilmot Hydrotators for cleaning Egg, Stove and Nut anthracite may not be news to many readers. Units have been in actual use for some months. But the excellent results they are giving is news . . . welcome news, we believe. Plant records confirm that these new machines clean the larger sizes with the same speed and controlled quality that have long made Hydrotators the most efficient for smaller sizes. Please note that these new machines are especially designed for Egg, Stove and Nut, and are in every detail built to take the heavier load. They embody all the recent engineering improvements that make Hydrotators fully automatic, and proof against loss in refuse. Let us send you further details of how you can now get more cleaning efficiency and capacity from floor space by completely equipping your breaker with Hydrotators for the preparation of all sizes of anthracite.

*Especially Designed
for EGG • STOVE • NUT*

DATA ON NEW HYDROTATOR

Diameter of Cone 5 ft.

Clean Coal Capacity, per hour . . 60 tons

Refuse Capacity, per hour 40 tons

Wilmot Standard Hydrotators are furnished for Pea, Buck, Rice, Barley and No. 4 sizes; and Hydrotator-Classifiers for No. 5 ($-3/64"$ to $+48$ mesh) and No. 6 (-48 to $+100$ mesh) anthracite fines.



*New
120-PAGE BOOK
ON
COAL CLEANING
on request*



WILMOT ENGINEERING CO.

HAZLETON, PA.
Plant:
WHITE HAVEN, PA.

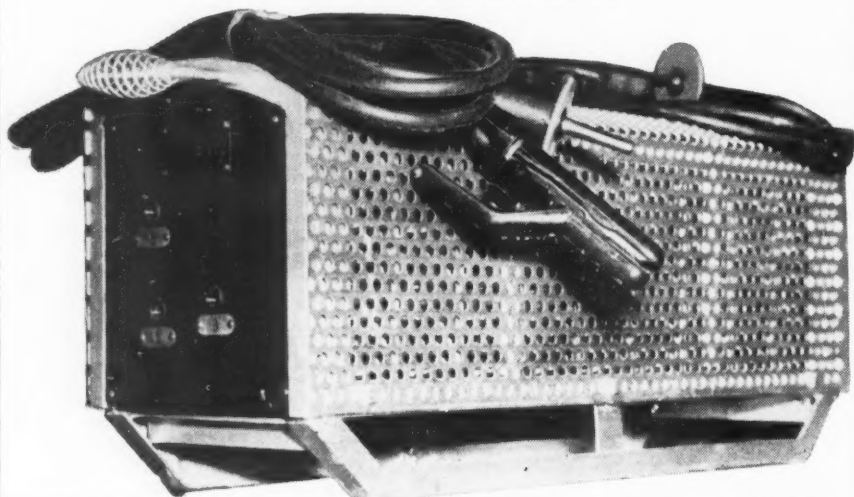
Wilmot Coal Preparation Equipment: Hydrotators • Hydrotator-Classifiers • Hydro-Separators • Simplex Jigs
Crushing Rolls • Sizing Shakers • Bucket Elevators • Conveyors • Car Hauls • Keystone Rivetless Chain, etc.

WILMOT BUILDS BETTER BREAKERS

A TRULY PORTABLE BOND WELDER!

Easily dragged even in low coal. Thin design permits easy removal from cars • Quick change taps provide proper welding current for all requirements.

Write for bulletins.



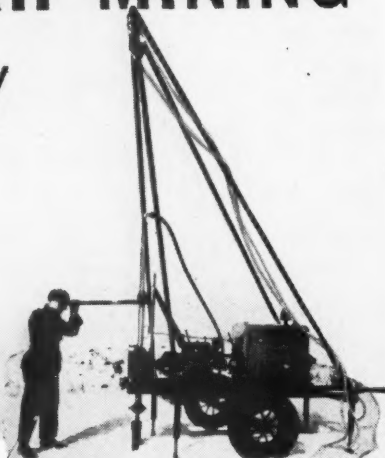
GUYAN MACHINERY CO. LOGAN W. VA.

for instance **STRIP MINING**

Know Positively

**DEPTH of
overburden**

**THICKNESS
and quality
of
COAL SEAM**



for least cost, labor and time

Light weight, simple operation, Acker Drills furnish complete subsurface information, accurate cores, from 300 ft. maximum depths. No feed screws or feed gears. Sturdy. Few parts . . . ideal for work in isolated locations. Easy to move over rough terrain; choice of mountings—truck, trailer or drag. Operate diamond, alloy or steel shot bits. Send for fully descriptive circular.

MODEL
LD

ACKER DRILL CO.,

SCRANTON 3, PA.

**ACKER ROTARY
CORE DRILLS**

No. 5 buckwheat coal; feed capacity, 50 t.p.h.

The Hudson Coal Co., Olyphant colliery, Scranton, Pa.—Contract closed with Wilnot Engineering Co. for one 7-ft.-diameter Hydrotator to prepare rice coal; feed capacity, 95 t.p.h.; and one 8-ft.-diameter Hydrotator to prepare barley coal; feed capacity, 100 t.p.h.

Tennessee Coal, Iron & Railroad Co., Concord mine, Pratt City, Ala.—Contract closed with Fairmont Machinery Co. for Chance cleaning plant, including Chance cone for 3x¼-in. coal and Allis-Chalmers dewatering screens for treating clean coal and refuse; capacity, 275 t.p.h. of clean coal.

Westmoreland Coal Co., Hampton mine, Boone County, West Virginia—Contract closed with Fairmont Machinery Co. for coal-preparation plant; capacity, 400 t.p.h., 8x0-in. coal; installation to include Chance cone for cleaning 8x¼, loading of five grades of coal, and provisions for crushing 2x1, 3x2 or 3x1 to stoker after washing.

Blue Bird Coal Co., Harrisburg, Ill.—Contract closed with Jeffrey Mfg. Co. for washing plant; capacity, 185 t.p.h., 6x0-in. coal.

Williams Coal Co. (Miners Coal Co.), Mannington, Ky.—Contract closed with Jeffrey Mfg. Co. for Baum jig; capacity, 400 t.p.h., 6x0-in. coal.

W. G. Duncan Coal Co., Greenville, Ky.—Contract closed with Jeffrey Mfg. Co. for diaphragm jig, capacity, 100 t.p.h., 1¼x0-in. coal.

Norfolk & Western Ry. Co., Williamson, W. Va.—Contract closed with Jeffrey Mfg. Co. for tippie equipment, capacity, 250 t.p.h., 2x0-in. coal.

Panther Coal Co., Marybill, W. Va.—Contract closed with Jeffrey Mfg. Co. for unit washer; capacity, 200 t.p.h., 4x0-in. coal.

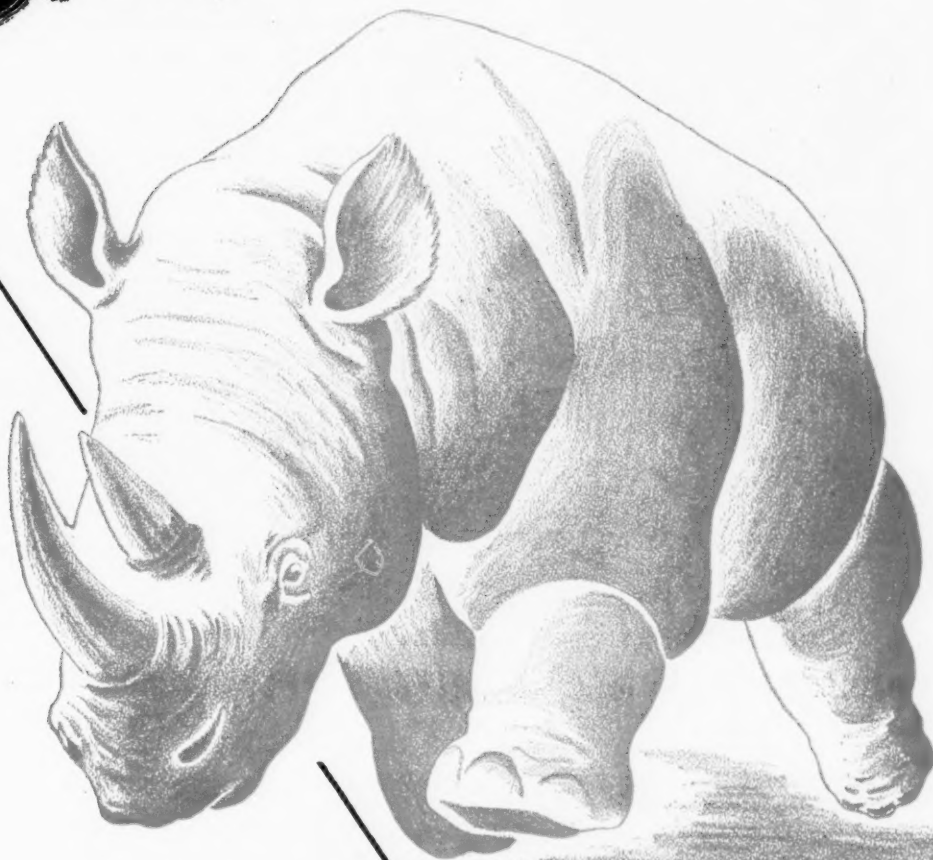
11 Killed, 8 Injured In Alabama Explosion

An explosion July 30 four miles underground from the portal of the Edgewater mine of the T. C., I. & R.R. Co., nine miles from Birmingham, Ala., resulted in the death of 11 miners and injury of eight more. Cause of the blast, which reportedly occurred in a remote section of the mine near the point where an air shaft being drilled from the surface joined underground workings, was not immediately determined. According to reports, previous inspections by federal mine inspectors had shown no violation of the Federal Safety Code. The mine had been inspected by federal inspectors in June and by state inspectors the week before the explosion. The mine resumed operations Aug. 9.



TOUGH

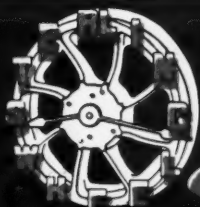
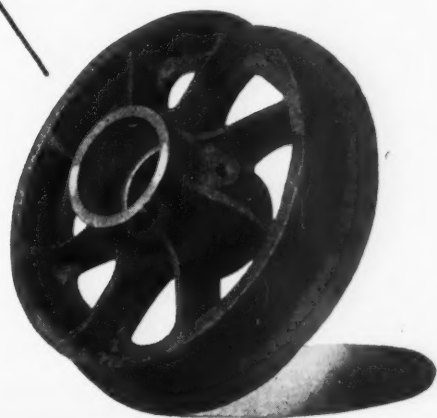
on delays



STERLING CAST STEEL WHEELS

**Will eliminate delays — save time
and labor without any additional
expenditure.**

Let us present the facts!



IT'S TIME TO RE-WHEEL
WITH STERLING CAST STEEL

Sterling

STEEL CASTING CO.
EAST ST. LOUIS, ILLINOIS

Lepley EQUIPMENT for COAL MINES



Leading coal mining companies will testify that Lepley skips have met the rugged requirements at a minimum cost demanded in modern coal and material handling operations.

Skips

For nearly 50 years we have designed skip loading equipment, rotary dumps, safety cages, sheaves, hoists and other allied units of mine machinery.

CONNELLSVILLE MFG. & MINE SUPPLY COMPANY
CONNELLSVILLE PENNA.



USE COFFING "SAFETY-PULL"
HOISTS FOR SAFETY,
SPEED AND POWER!



Save time safely on all types of mine lifting jobs with the rugged, easy operating Coffing "Safety-Pull" Hoist. Check these important features!

- Load suspended at all times on ratchet and pawl assembly—can't slip or drop!
- "Safety-load" handle bends before any other part of hoist will give!
- Super duty hooks of drop forged, heat-treated alloy steel!
- Tested to 100% over rated capacity! Capacities from 3/4 to 15 tons!

Send for Illustrated Bulletin G-4



COFFING HOIST COMPANY

A Quarter Century of Quality
DANVILLE, ILLINOIS

OTHER COFFING PRODUCTS
Quik-Lift Electric Hoists; Spur Geared Hoists; "Mighty-Midget" Puller; Hoist Jacks; Differential Hoists; Lead Binders; Trolleys.

Atomic Energy Group Scans Power Outlook

Ultimate output of atomic energy in the United States may be as great as the present output of coal-generated power or even greater, and "will operate at a lower cost, at least as far as fuel expenditure is concerned," declares the semi-annual report of the Atomic Energy Commission, issued in mid-July. This view on the economic prospects of atomic power is the most optimistic ever to come from official government sources, though private sources have estimated that the cost of atomic power would be between that of hydro and steam.

The AEC forecast is based on two assumptions: (1) that the cost of uranium does not rise sharply in the future because of exhaustion of high-grade ores and (2) that the theoretical possibilities of making atomic fuel can be translated into engineering practice. If these assumptions prove false—that is, if the cost of uranium ore does go up sharply and if theory cannot be translated into engineering practice—atomic power could compete with coal-generated power only in areas where transportation costs from coal mines are the determining factor, the report pointed out.

If experimental atomic power plants now under construction prove out, the AEC thinks that "fairly practical reactors that might be useful for special purposes" should be available within 10 years and that within 20 years "a considerable portion of the present power supply of the world" might be replaced by nuclear fuel. The two experimental plants referred to in the commission's report are set for completion within the next two or three years. One of these is the air-cooled natural uranium pile at Brookhaven Laboratory, Long Island, N. Y., which is expected to produce some power from the heat of its cooling air but not enough even to run the blowers which drive the cooling system. The other experimental plant is at the Argonne Laboratory, Chicago, Ill., construction of which was given formal approval in June. The Chicago plant will be a fast-neutron pile using enriched fuel and cooled by liquid metal. It will run at high temperature and will produce power in something like commercial quantities, though hardly at commercial costs.

Bureau Plans Early Start On Lignite Laboratory

Work on the design of the \$750,000 lignite research laboratory at Grand Forks, N. D., will start immediately and construction will get under way by fall, said Interior Secretary J. A. Krug in a statement July 23. Completion of the laboratory is scheduled for the end of 1949. The University of North Dakota has do-

No Adjustments...

Long Life...



This Clutch Adjusts Itself ...Cuts "Down-Time" Losses

Fawick whips construction and mining equipment clutch problems—all of them, and for keeps!

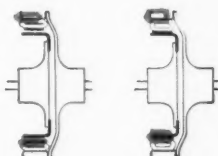
There is only *one* moving part in a Fawick Clutch—the rubber-and-fabric pneumatic tube faced with friction blocks. This one part naturally stays in perfect adjustment at all times. It automatically compensates for wear of the friction blocks. It puts an end to time-wasting, clutch-adjustment shutdowns.

No wonder users favor Fawick-equipped machines. They do more work at less cost and earn more money. That's why more and more progressive shovel, crane, drag line and other heavy equipment builders are using Fawick.

Get more production at lower cost—specify Fawick in the next equipment you buy.

HERE'S HOW IT WORKS

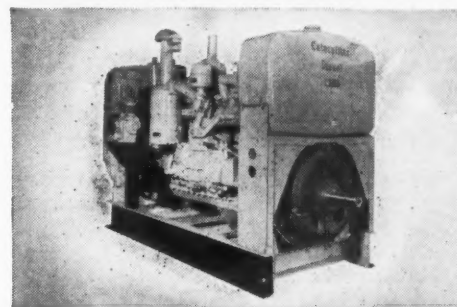
Compressed air expands the rubber-and-fabric tube to engage clutch with any degree of "grip" you want. Release the air and clutch disengages.



Marion Power Shovel Model 111-M 4-yard Shovel with Fawick Power Take-off on Cummins LI-600 Engine.



Browning Locomotive Crane with Fawick Power Take-off on Caterpillar D-13000 Engine



Caterpillar D-13000 Power Unit with Fawick 0-2-14CB400 Power Take-off.



FAWICK



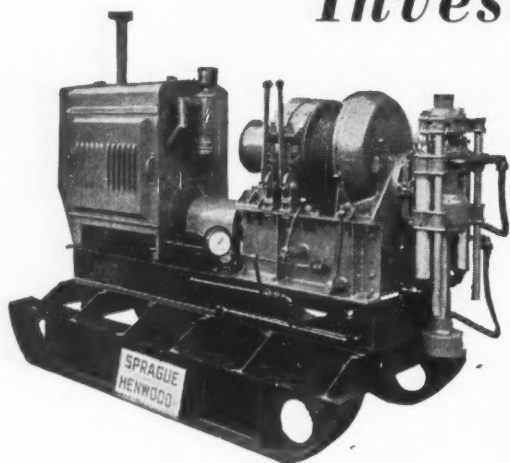
CLUTCH

FAWICK AIRFLEX CO., INC.

In Canada, Renold-Coventry Ltd., Montreal, Toronto, Vancouver, Quebec • In Britain, Crafts Engineers, Ltd., Bradford, England

9919 Clinton Rd., Cleveland 11, O.

Investigate



this MODERN Core- Drilling Machine



It's Engineered to Meet Your Most Severe Demands

Sprague & Henwood Core Drilling Machines are modern in every respect. . . Can EASILY perform the work expected of them! That's because they are built to meet the demand of present day core drilling work! The machines are high speed, exceptionally sturdy, constructed to withstand rugged service. Available with two distinct types of feeds. "Screwfeed" and "Hydraulic," according to the type of swivel head selected. Have many exclusive features. Write today for full details.

Bortz DIAMOND BITS are also manufactured by Sprague & Henwood. Full details sent upon request.

SPRAGUE & HENWOOD, INC.
Department K SCRANTON, PA., U. S. A.



BEARINGS

Cost less because they wear longer—wear longer because of a specific formula for every requirement.

AXLE BEARINGS, JOURNAL LINERS, BUSHINGS, AND WEARING PARTS, FOR GENERAL ELECTRIC, SULLIVAN, WESTINGHOUSE, GOODMAN, OLDROYD, JOY, JEFFREY EQUIPMENT.

PROMET BABBITT

Lead or tin base. 3 grades.

PROMET BAR STOCK

Round, hexagon, square. Rough case, semi-finished. Cored stock all sizes (by 1/8" steps) from 1/2" minimum core to 12" O.D. and 12" lengths. 6 grades of hardness.

WRITE FOR FREE FOLDERS

THE AMERICAN CRUCIBLE PRODUCTS CO., 1307 Oberlin Ave., Lorain, Ohio, U. S. A.
Prompt deliveries can usually be made from stocks maintained at

BECKLEY, W. VA., The Universal Supply Co. Phone 7307
1207 S. Kanawha St.

LORAIN, OHIO, The American Crucible Products Co. Phone 6983

Other Representatives

ALTON, ILL., Frank E. Rhine, 623 Blair Ave. Phone 3-8624

BIG STONE GAP, VIRGINIA, C. P. Cawood Box 290

BIRMINGHAM 3, ALA., F. B. Keiser, Jr., 1309 First National Bldg. Phone 7-2383

MT. LEBANON, PA., J. E. Nieser 720 Roselawn Ave. Phone LE-9876

NEW YORK CITY, Trans American Commerce Co., Inc., 165 Bldg. Phone COrtlandt 7-4340

WILLIAMSON, W. VA., Williamson Supply Co. Phone 1200

nated 12 acres of land to the project. Basic facilities of the laboratory will include a laboratory for small-scale research, a general service section for supplies and a machinery bay suitable for large-scale pilot-plant research. One of the major problems to be tackled is a method of drying lignite to make it transportable without crumbling for wider geographical distribution. Other research projects will include lignite-burning equipment, gasification and wider scientific, chemical and technical uses for lignite.

Panther Valley Miners End Nine-Day Walkout

The nine-day stoppage of 7,000 Panther Valley anthracite miners ended July 20 with acceptance by the miners of a proposal aimed at settling the dispute over "contract" and "consideration" rates. The proposal, made by Evan Evans, president, Lehigh Navigation Coal Co., included definitions of rates and procedures for classifying men. The dispute had started at the company's No. 9 mine, Coaldale, Pa., when the company refused to pay full time for failure to work full shifts. Added to this dispute was the refusal of hoisting engineers at the Hazle Brook, Germantown and Continental mines to submit to physical examinations. The hoisting engineers cited a local union rule forbidding such tests.

Mines Bureau to Survey Coking Coal Reserves

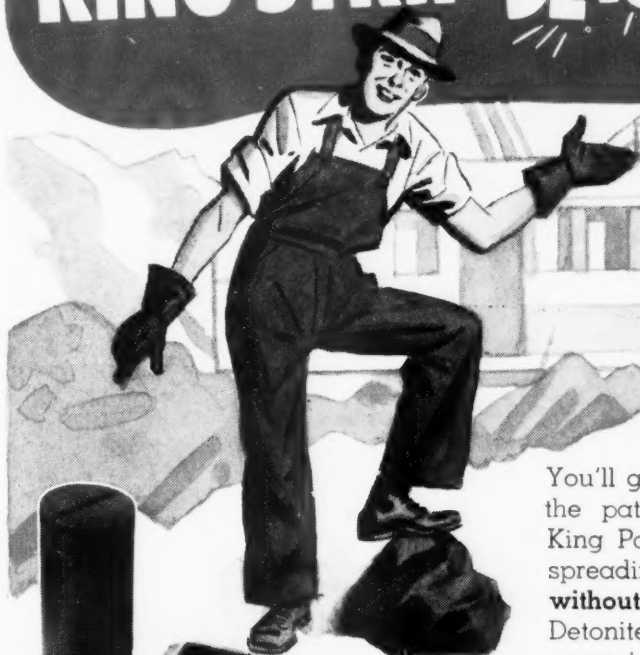
A nationwide survey of mineable coking coals to serve as a guide in developing adequate reserves for use in times of national emergency, has been launched by the U. S. Bureau of Mines, it was announced last month.

Beginning in sections of Pennsylvania, West Virginia, Kentucky, Tennessee, and Alabama, the survey will be extended to every coal-producing state. A shortage of coking coal developed during the war and has become more acute with the record level of peacetime steel production, it was pointed out.

Assisting the Bureau in the survey is the Coal Resources Committee of the National Bituminous Coal Advisory Council. The Coal Conservation Committee of the Council also is working with the Bureau in a companion program to extend the supply of coking coals through washing and blending studies.

Simultaneously, the Bureau of Mines will step up its research in blending coals and up-grading submarginal coals to augment the coking coal supply, and expand its investigation of coal reserves in Alaska. The work is a part of a program for which Congress appropriated \$450,000 for the current fiscal year.

We're moving more yardage,
faster, at less cost
 since shooting with
KING STRIP DETONITE



You'll get faster, easier digging when you shoot with Detonite—the patented, surface-sensitized stripping explosive that only King Powder can make. Detonite has a unique slow, heaving, spreading action that lifts and fully displaces the overburden—**without killing the coal.** Rock is broken into easy-to-handle sizes. Detonite's more efficient fragmentation cuts down equipment wear, increases yardage and lowers all-around operating costs.

WE'LL GLADLY DEMONSTRATE DETONITE'S SUPERIOR
 ACTION IN YOUR STRIP PIT, WITHOUT OBLIGATION!

DETONITE is especially designed to shoot overburden with the greatest economy. Unique action relieves the shovel and at the same time protects the coal. Packed in convenient cartridges suitable for all loading conditions.

1878... Our 70th Year... 1948

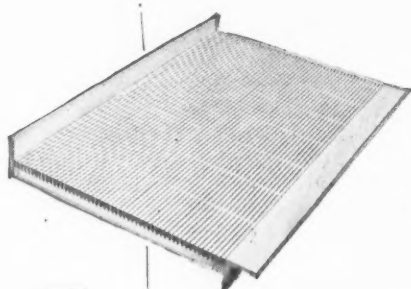
DETONITE

THE PATENTED SURFACE-SENSITIZED HIGH EXPLOSIVE

Here's how you can arrange a demonstration: Just write or phone us—set the date—and we'll do the rest. Then you can see for yourself how Detonite will work for you under your own conditions. More and more stripping operations are shooting with Detonite after viewing its superior performance on their own properties. Why don't you arrange for a demonstration, today?



THE KING POWDER CO.
 INC.
 CINCINNATI, OHIO
 INCORPORATED 1878



Dewatering and Drying with Hendrick Wedge-Slot Screens



Type C
Profile Bar



Type B
Profile Bar

Where material is highly abrasive, Wedge-Slot Screens with Type C Profile Bars are recommended. The parallel head flanges of Type C resist slot enlargement from abrasion, while the taper from the flange to the shank speeds dewatering.

Because of their resistance to abrasion, screens with Type C Profile Bars are frequently employed at the feed end of equipment, following washbox discharge. Then when the material has formed a bed and is traveling horizontally, screens are used with Type B Bars, which taper sharply from the slot line.

Type C Bars are also used to dewater refuse, and to bypass sand and surplus moisture from Chance cones, in cone outlet weirs; and for conveyor chute bottoms to dewater abrasive material, such as anthracite.

Standard Type C Bars are 9/64" wide; heavy duty Type C Bars are 12/64" wide. Regularly stocked in stainless straight chrome and in 18-8 plain steel and abrasive-resisting steel.

Write for full information.




Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Mitco Open Steel Flooring
"Shur-Site" Treads and
Armorgrids

HENDRICK

Manufacturing Company

41 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities



FLEXIPIPE

The improved flexible tubing for
mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy installation. On account of its flexibility, it can be put up or taken down in a fractional part of the time required by more rigid means of face ventilation.

Write for free sample and full information

BEMIS BRO. BAG CO.

412 Poplar Street, St. Louis 2, Mo.

Industrial

Creosoting and Painting

Prolong the Life of your Tipples, Coal Bins, Washers, Bridges, etc. By having them Creosoted—Metal Buildings Also Painted.

PHONE, WIRE OR WRITE

DAVIS CREOSOTING CO.

1428 Princeton Ave., Birmingham 7, Ala.

Illinois Mines Bureau Gets Mine Rescue Trucks

The first three mobile mine-rescue trucks ordered by the Illinois Department of Mines and Minerals was delivered and put into service early last month. The \$16,000 unit is equipped with fire fighting apparatus, respirators and first-aid supplies and will accommodate a rescue crew of 29 men. The truck is to be stationed at the mine rescue station at DuQuoin. A second truck, scheduled for delivery in October, is to be based at Springfield, with the third unit on order to be located at Benton when delivered.

Seedlings Planted on Strip-Mine Land

More than 100,000 pine and locust seedlings and a large variety of hardwoods have been planted and more than 50 acres have been sowed to grasses and legumes since the organization of the Kentucky Reclamation Association, Inc., Madisonville, last January. The group comprises 25 Kentucky strip-mining companies in western Kentucky. Plans now being made for fall planting and sowing call for several crews of men and equipment. During the off-season, James H. Moore, field director of the organization, has surveyed open-pit banks in the region, making soil tests for acidity and other natural chemicals to determine what trees, legumes and grasses will grow best. The U. S. Department of Agriculture also has planted experimental plots in western Kentucky and will make recommendations for further plantings by the association.

Coal Publications

A Combination Cleaning and Dewatering Process for Treating Fine Sizes of Coal: Preliminary Report, by B. W. Gandrud and H. L. Riley. U. S. Bureau of Mines, R. I. 4306. 25 pp. plus 9 pp. of illustrations and graphs. 8x10½-in.; paper; mimeo. Free. Description of a kerosene flotation process, still under development and study by the Bureau and the University of Alabama, for cleaning and dewatering fine sizes in one integral operation. Sizes subjected to experiment were from about 10-mesh to 0.

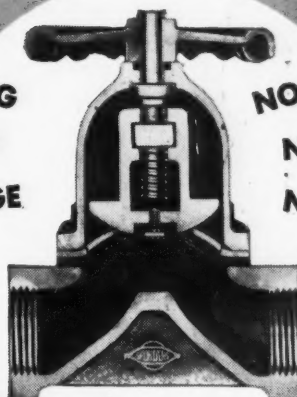
A Selected Bibliography on Briquetting of Coal, and Other Carbons, by Paul L. Fisher. U. S. Bureau of Mines, I.C. 7469. 15 pp. 8x10½-in.; paper; mimeo. Free. List of government publications, technical press articles and cooperative reports of work done with states, colleges and industries on briquetting.

If you're interested in valves that will give you any or all of these operating advantages then you'll be interested in

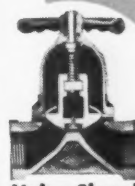
GRINNELL - SAUNDERS DIAPHRAGM VALVES

NON-CONTAMINATING
MINIMUM MAINTENANCE
NO VALVE STEM LEAKAGE

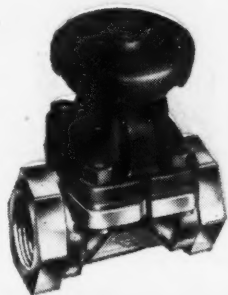
NO CORROSION
NO CLOGGING
NO SEEPAGE



Valve Open

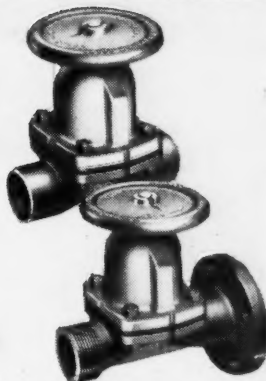


Valve Closed



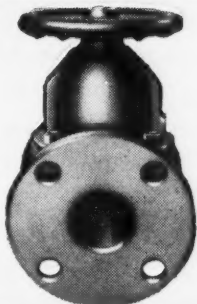
FOR CHEMICALS

Stainless Steel valves with special diaphragms are handling satisfactorily such corrosive chemicals as phosphoric, acetic and chromic acids.



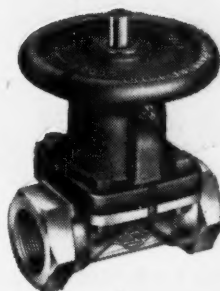
FOR BEVERAGES

Bronze valves with socket ends (left) and with hose threaded end (right), both with special white rubber diaphragms, are stopping leaks and cutting maintenance to the bone in breweries handling millions of barrels of beer.



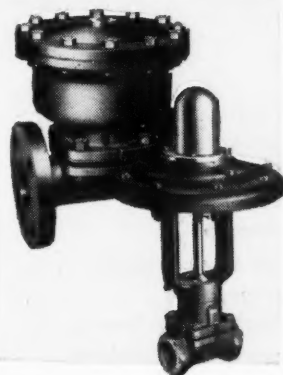
FOR PULP and PAPER

Rubber lined valves are setting new performance records handling pulp, alum and sulphuric acids in pulp mills.



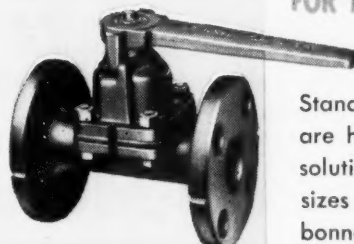
FOR TEXTILE PLANTS

Aluminum body valves with rising stems have won enthusiastic approval in bleacheries handling hydrogen peroxide and other chemicals.



FOR FOODS

Piston-operated valves (left) and air motor operated valves (right), both glass lined and with proper diaphragms, are providing remote control in plants handling sodium chloride, sodium hydroxide, sulphuric acid and fruit juices.



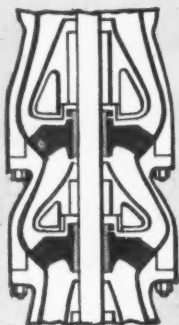
FOR MINES

Standard rubber-lined valves are handling highly abrasive solutions and slurries. Small sizes with quick-operating bonnets are widely used on compressed air lines to prevent leakage.

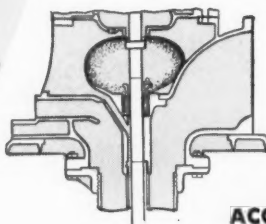
Grinnell-Saunders Diaphragm Valves may eliminate valve troubles and cut valve maintenance on your pipe lines. Available in any combination of valve bodies and linings, diaphragms and operating mechanisms. State your requirements or ask for Catalog 2-S on "Grinnell-Saunders Diaphragm Valves". Grinnell Company, Inc., Providence 1, R. I. Branch warehouses in principal cities,

GRINNELL

WHENEVER PIPING IS INVOLVED



OPEN IMPELLERS
 ... that eliminate
 overloading, sand-locking
 and costly stoppages
 ... minimize wear
 ... eliminate the
 need for sealing
 or wearing rings.



**ACCESSIBLE
 PACKING BOX**
 ... located at the surface
 where it is easily inspected,
 tightened or repacked.

**You Get
 More than
 Performance
 with**

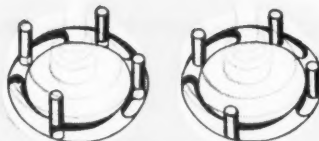


POMONA!

Almost any good pump will give you performance ... *at the start*. But Pomona Vertical Turbine Pumps give you *sustained performance* ... consistent efficiency for years *plus* the fundamental simplicity of design that adds up to lowest operating and maintenance costs. Here's why!



**ADJUSTABLE FOR CAPACITY
 AND WEAR.** With a simple "at the surface"
 adjustment, capacity can be varied over a
 wide range without throttling. Adjustment
 can also be used to compensate for wear
 to retain peak efficiency for life.



NON-REVERSE RATCHET ... prevents pump
 and motor from rotating backwards
 ... eliminates possible damage to pump
 from accidental power reversal
 ... reduces wear and maintenance.

PLUS true water lubrication and many
 other important advantages your
 Fairbanks-Morse Pomona dealer or branch
 pump engineer will be glad to demonstrate.
 Fairbanks, Morse & Co., Chicago 5, Ill.

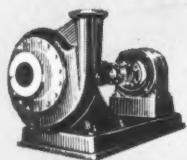


FAIRBANKS-MORSE

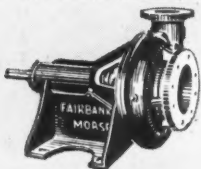
A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES • MOTORS • GENERATORS
 STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS

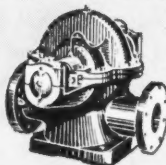
A FEW OF THE COMPLETE LINE OF FAIRBANKS-MORSE PUMPS



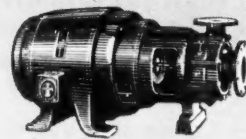
Trash Pumps



Side-Suction



Centrifugals

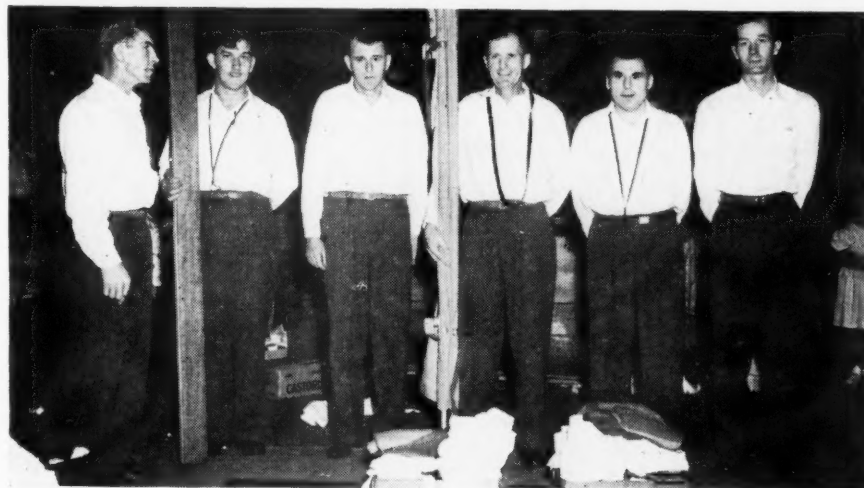


Built-together

Ohio Safety Meet Draws Large Crowd as . . .



PART OF THE CROWD of more than 7,000 people attending the Coal Miner's Accident and Safety Meet at Bridgeport, Ohio, last month.



WINNER of the first aid contest was this team from Wheeling Township Coal Mining Co., which scored 99.73 to beat out 12 other teams.

Wheeling Township Wins Top Honors

MORE than 7,000 miners and their families, federal state, company and union officials attended the Coal Miner's Accident and Safety Meet held at Perkins Athletic Field, Bridgeport, Ohio, Aug. 14, on the third anniversary of V-J Day. Winner of the first aid contest climaxing the day's activities was the six-man team from the Wheeling Township Coal Mining Co., placing first among 12 other teams with a score of 99.73. Taking second place was the team from Piney Fork No. 1 mine of the Hanna Coal Co. Teams from Dun Glen mine, Hanna Coal Co., and Wolf Run mine, Warner Collieries Co., took third and fourth, respectively. All four teams are entitled to compete in a similar

state-wide contest to be held in Columbus next spring.

Members of the winning team shown above are: Louis Jesalosky (left), captain, Joe Erdos, Kenneth Grear, George Weir Jr., Fred Marshall and Rennie Bradley. A total of \$6,500 in prizes was awarded in connection with the event. Members of the winning team received an expensive watch and other competing team members also received awards.

Another feature of the safety day was the presentation to the crowd of the "16 Best Looking Miners' Wives," selected by W. H. McWilliams, columnist of St. Clairsville. Other events included an all-star ball game between members of the U.M.W.A., band concerts and an ox roast.

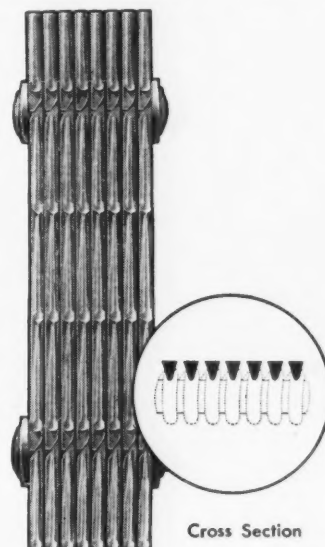
What are the production costs on

DIRT?

Every ton of raw, unwashed coal shipped from the mines is 15% dirt—useless dirt that costs good dollars to mine and ship to the customer.

That's why major operators throughout the industry are planning for up-to-date washeries to help produce cleaner, more saleable coal.

If your plans call for a washery, call in a Cambridge engineer for his recommendations on dewatering and classifying screens of Cambri-Wedge Riffle Surface wire . . . manufactured under the patent of the famous British Wedge Wire Co., Ltd.



Cross Section

Cambri-Wedge wire screens are available in a wide range of metals, including stainless steel—in mesh sizes ranging upwards from .005"—and in any length or width of flat or Riffle Surface.

They offer you free drainage—freedom from clogged openings—and maximum screen rigidity.

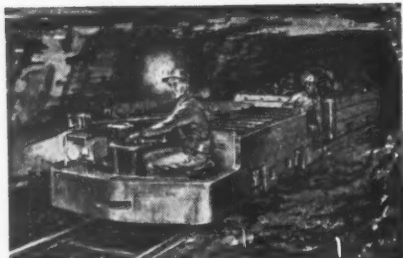
For full information on Cambri-Wedge screens, write for free folder.



Cambridge
WIRE CLOTH CO.

Department M • Cambridge 9, Md.

SALES OFFICES IN: BOSTON • NEW YORK
BALTIMORE • PITTSBURGH • DETROIT
CHICAGO • SAN FRANCISCO • ST. LOUIS



Equipment News

More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer

Earthmoving Units, Diesel Engines

Plans for the production in the near future of ten new models that will include expansions of existing lines and the offering for the first time of 500-hp. diesel engines and two-wheeled self-propelled scrapers, have been announced by the Caterpillar Tractor Co., Peoria, Ill. Volume production of the new units, which will supply more power to handle present applications more efficiently and an even greater range of applications than is now covered by the company's line, will begin as quickly as the current expansion of manufacturing facilities at the company's plant at Peoria will permit.

Units being added to the company's line include a new two-wheeled tractor-scraper unit and new four-wheeled tractor-wagon unit; two additional scrapers; four new diesel engines to be made available as industrial power units and electric sets; and a fifth new diesel engine integral with the wheel-type tractors. The models announced are:

DW21 two-wheel tractor and matched trailing No. 21 scraper (see illustration); powered by a new 225-hp. diesel engine; five speeds forward up to 20.6 m.p.h., one reverse, 2.9 m.p.h.; scraper struck capacity, 14½ cu. yd.; 9½ ft. cut.

DW20 four-wheeled tractor, equipped with the W20 wagon; powered by a new 225-hp. diesel engine; five speeds forward up to 26 m.p.h., one reverse, 3.6 m.p.h.; struck capacity, 14 cu.yd.

No. 40 hydraulically-controlled scraper for use with the D4 track-type tractor; struck capacity, 3.6 cu.yd.

No. 90 scraper for use with the company's recently improved and re-



A LOW-BED TRAILER for moving heavy equipment and requiring no special prime mover has been made available by the Alfred Stauffer Machine Shops, Honey Brook, Pa. Standard equipment includes vacuum or air-hydraulic brakes, breakaway cables and lighting. The trailer comes in two models: Model A6, 6 tons, 2 wheel, 88 sq. ft. loading area; Model A10, 10 tons, 4 wheels, 101 sq. ft. loading area.

powered D8 track-type tractor; struck capacity, 21.2 cu.yd.

D397 diesel engine, 500-hp. V12 with blower.

D386 diesel engine, 400-hp. V12.

D375 diesel engine, 333-hp. V8 with blower.

D364 diesel engine, 267-hp. V8.

Tubing, Brattice Cloth

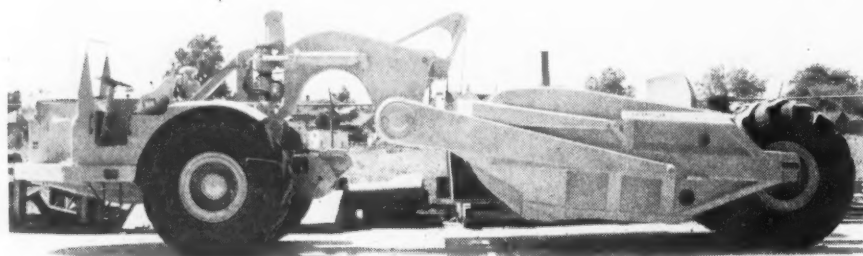
A new "glass cloth" known as "GlasAire" and reportedly composed of glass fiber impregnated with a tough plastic is now available in mine tubing and brattice cloth said to be impervious to rot, fungus, acid and many other unfavorable underground conditions. GlasAire tubing and brattice cloth is manufactured by

Better Finishes & Coatings, Inc., Newark 5, N. J., and is exclusively distributed by the Wilkes-Barre Equipment Co., Wilkes-Barre, Pa., which has announced completion of its first year of sales and installation of both products, with successful operation reported by many users.

A 12-in. tube of GlasAire 50 ft. long is said to weigh only 12 lb. It is equipped with a patented detachable coupling. Repairs to the cloth in either the tubing or brattice can be quickly and easily made, it is said, by applying a patch of the same cloth with GlasAire adhesive, with a permanent patch obtained because of the character of the adhesive. Tensile strength of the cloth is high and long service is to be expected, according to the manufacturer. GlasAire brattice cloth is now available in 36- and 50-in. widths, with production of larger sizes to begin soon.

Conveyor-Belt Splicing

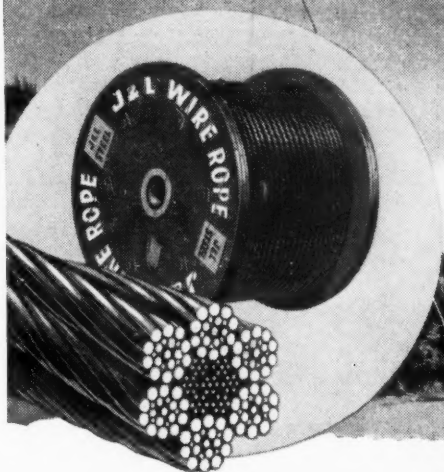
The Hayden Belt Splicer System, widely used in British and European mines, is now available in the United States through National Mine Service Co., the exclusive distributors, with offices in Beckley and Logan, W. Va., Jenkins, Ky., and Forty Fort, Pa. An unusually strong joint that is fully flexible, does not injure the belt and can be more quickly and cheaply ap-



PENBROOK GETS TWICE THE SERVICE FROM J&L *Precisionbilt* WIRE ROPE

J&L STEEL

.... average life jumps from
382 hours to 805 hours,
removing 100% blasted rock!



The J&L Precisionbilt wire rope used for the dragline on this machine: 1 3/4" diameter, 6x19 Type "U", Lang Lay with independent wire rope center.

RECORDS kept by Penbrook Contracting Company over a period of 20 months on an anthracite strip-mining job near Ashland, Pa., show that J&L Precisionbilt wire rope has given more than *twice* the service life of two major competing brands.

Average life of
9 brand "A" wire ropes: 397.6 hrs.

Life of 1 brand "B" wire rope: 240 hrs.

Average life of
all 10 wire ropes: 381.8 hrs.

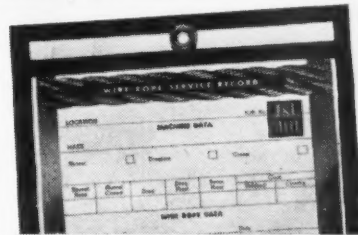
Average life of 6 J&L
Precisionbilt wire ropes: 805 hrs.

As a result of this performance, Penbrook now uses a variety of J&L ropes on its 21 draglines and shovels engaged in two hard coal stripping operations in Schuylkill County, Pa., and six soft coal jobs in Clearfield County, Pa.

This is a typical example of a quality product, correctly applied and properly handled—a combination without which this advertisement could not have been written.

There is a J&L Precisionbilt wire rope for every purpose. Why not

make your own comparison. We'll gladly send you wire rope service-record cards and a transparent holder *free*.



Jones & Laughlin Steel Corporation
411 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me a supply of wire rope service-record cards and transparent holder.

NAME _____

COMPANY _____

ADDRESS _____

JONES & LAUGHLIN STEEL CORPORATION

Accidents-



Speak louder than words...

Underground mine timbers weakened by decay . . . a cave-in . . . tense, agonizing hours of waiting, mute praying . . . and then, the unmistakable finality as four bodies are brought to the surface. What good are words.

Yet, words could have helped prevent such an accident . . . words outlining a safety plan to be carried out by Bituminous Safety Engineers.

Bituminous Safety Engineers combine laboratory and field work in providing a complete safety program for Bituminous Workmen's Compensation policyholders. This program, which helps save lives and reduce the frequency and severity of accidents, includes regular mine inspections . . . analysis of mine hazards . . . survey results recommendations . . . accident prevention activities . . . reduction of operating expenses resulting from accidents . . . and establishment of production efficiency. Not only mine owners, but operators and workers as well benefit. They all learn the true meaning of the Bituminous slogan,

Security with Service

BITUMINOUS CASUALTY CORPORATION
ROCK ISLAND ILLINOIS

OVER 30 YEARS OF SERVICE
TO THE INDUSTRY



A MECHANIZED WHEELBARROW known as the "Prime Mover" and manufactured by Bell Aircraft Corp., Buffalo, is powered by a 3-hp. gasoline motor that will run for eight hours on 3 gal. of gasoline. It holds 600 lb. of coal, for example, and can climb a 20-percent grade fully loaded. Top speed is that of a fast walking pace and dumping is controlled by a foot pedal. Attachments are available to make the unit into a bulldozer, snowplow or platform truck.

plied without special training are features of the system, it is said.

Basis of the system, according to National Mine Service, are finely ground taper-pointed belt-fastener hooks that are quickly inserted into the ends of the belts to be spliced by a machine especially built for that purpose. The hooks knit into the belt without tearing or damaging the belt structure in any way, require no punched or drilled holes and are bent within the belt to provide strong non-damaging grip, it is said. The open ends of the hooks are connected by spindles of especially wound steel wire that may be quickly inserted or removed.

The portable fastening machine, which can be quickly and easily operated even by untrained workmen the company says, can be used on any size belt but is designed to splice a 30-in. belt at one setting. Where highly corrosive mine water or abrasive materials are factors, hooks of stainless steel may be used and for belt greater than 5/8 in. thick heavier hooks in stainless steel only are available. Special fastening units are available for use in low coal.

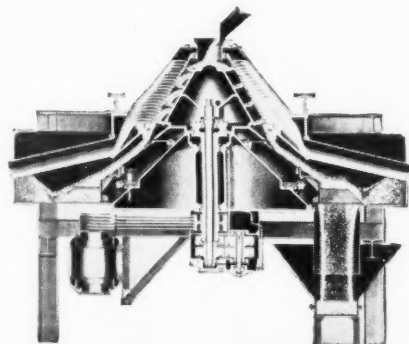
Nylon-Coated Wire Rope

A nylon-coated wire rope, called "Wirelon," now is being produced commercially by Rochester Ropes, Inc., Culpepper, Va., in diameters ranging from 1/32 in. to 1 in. or greater. The nylon coating, applied either to single strands before the rope is formed, to the outside of ropes already formed or to single strands

THE CMI CONTINUOUS CENTRIFUGAL DRYER

at many leading preparation plants dewater the finer sizes of coal to a lower moisture content than could be obtained from any other machine or method. This is accomplished regardless of the size and at a very low cost per dry ton.

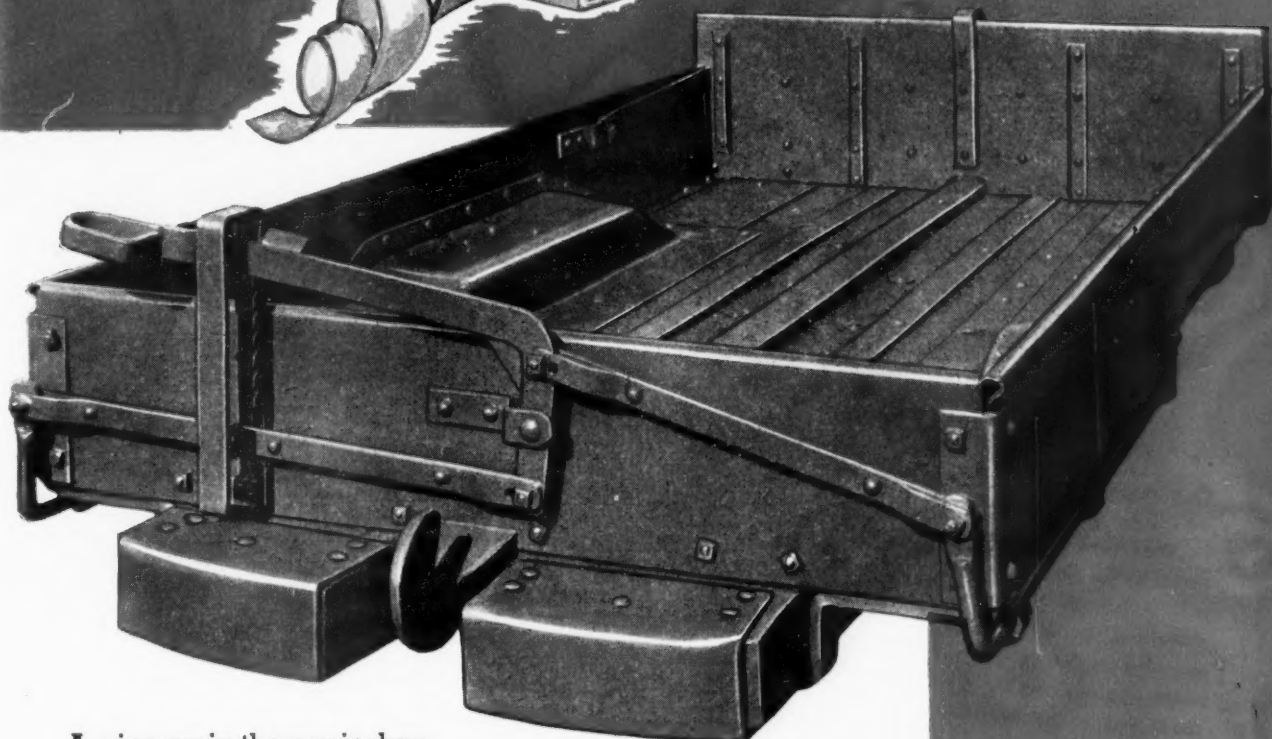
Let us tell you about these many installations and submit our recommendations for your drying problem.



**CENTRIFUGAL
AND MECHANICAL
INDUSTRIES, INC.**

146 PRESIDENT ST.
ST. LOUIS 18, MO.

SHAVES PRODUCTION COSTS



A mine car in the repair shop hauls no coal. It's dead weight. It means that while that particular car is being repaired, you are paying more money to haul less coal, because repairs cost, too.

Keeping production costs down by keeping cars on the track is no trick when you use Enterprise. These are cars built to stand the gaff. They are engineered to carry more coal per car, and to roll trouble free. They are your best bet for holding down production costs!

Enterprise cars are expertly designed and custom-built to meet your specific problem . . . to operate in any headroom with mechanical or hand loading. Call on our engineers — they are at your service.



ENTERPRISE

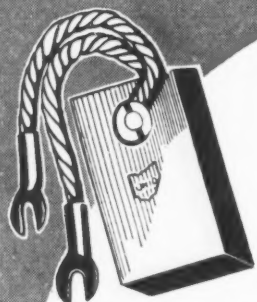
Wheel and Car Corporation

MINING AND INDUSTRIAL EQUIPMENT

Bristol, Virginia - Tennessee • Huntington, West Virginia

Buy

YOUR GENERATOR
AND MOTOR BRUSHES
from a
SINGLE SOURCE



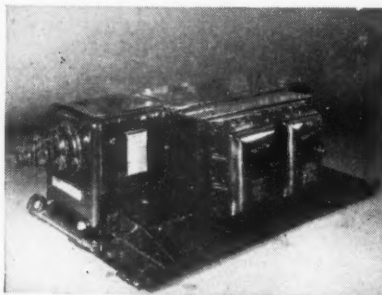
HERE'S WHY

Our organization develops and manufactures brushes from the raw material to the finished product. Although we carry standard items in stock, we also maintain a complete engineering staff to assist you in the selection and application of correct brushes for your equipment. We base our 30 years of reputable existence upon our SERVICE to INDUSTRY. Try Ohio for your brush requirements.



THE OHIO CARBON CO.
12508 BEREA ROAD
CLEVELAND 11, OHIO

and then to the finished rope, is unaffected by oils, cleansing agents of alkalis and is unharmed by nitric, hydrochloric or sulphuric acid in concentrations up to one percent. The coated rope operates well at high and low temperatures and retains its flexibility whether wet or dry, according to the manufacturer. The plastic coating reduces birdcaging, fanning out or kinking and gives protection against steel splinters. A bulletin covering further applications and properties is available from the manufacturer.



Portable Dry-Type Power Center

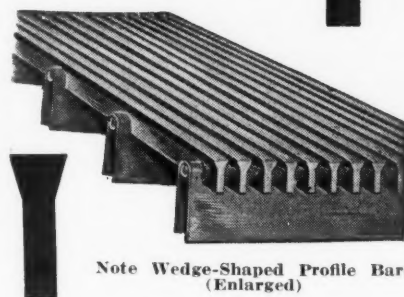
A three-phase portable explosion-proof electric-power center for low-height underground service has been announced by Westinghouse Electric Corp. High- and low-voltage plugs and receptacles enable the mine electrician to make quick connections. An aluminum case with dry nitrogen hermetically sealed in provides protection from explosion, dirt, falling objects, corrosive fumes and moisture. Class H insulation provides greater short-time overload capacity, better voltage and lower total losses, it is claimed. A safety circuit center on the low-voltage side, rated "permissive" and manufactured by the Mine Equipment Co., gives complete protection and control. The center is equipped with two, three or four Westinghouse Type AB circuit breakers. Transformers are skid-mounted for easy pulling around the mine. Sizes of 75, 100 and 150 kva. are available for three-phase 60-cycle high voltages of 2,400, 4,160, 4,800 and 7,200 volts. Low voltages of 240 Y/138 with rated kva. tap for 230 Y/133, or 480 Y/277 with rated kva. for 460 Y/266 can be supplied for any of the primary voltages listed. Height for units rated from 2,400 to 4,800 volts is 25 1/4 in.; for the three ratings at 7,200 volts, height is 34 in.

Self-Powered Telephone

Wheeler Insulated Wire Co., Waterbury, Conn., has announced a self-powered telephone for use where power supply is unavailable or uncertain. The unit requires no battery or other power supply. Supplied for two-station pair-phone operation,

continuous open slots

THE WEDGE-BAR SCREEN



Note Wedge-Shaped Profile Bars
(Enlarged)

NO UNPERFORATED AREA NO BLINDING OR PACKING

The Wedge-Bar Screen has two distinctive features:

- 1—Continuous open slots over entire Screen Surface.
- 2—Downward enlargement of slots rapidly draws off moisture and fines because of the wedge-shape-profile bars.

moisture, undersize clear quickly!

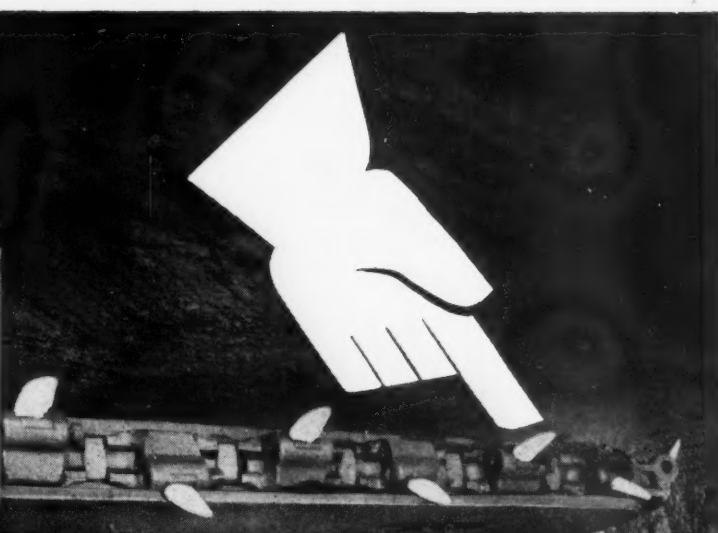
U-holder supports have maximum carrying capacity and rigidity, with minimum weight.

Wedge-Bar Sections are designed and fabricated to fit your equipment, do your job most efficiently. Send for data sheets, fill them out, and without obligation on your part we will make recommendations. Illustrated catalog promptly upon request.

Shaker Jackets • Vibrating Screens
Panels • Chutes • Conveyors • Dryers

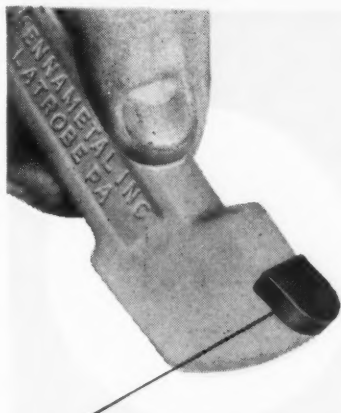
WEDGE-BAR SCREEN CORP.

2006 BAYPORT PL., FAR ROCKAWAY, N. Y.



**One Set
Cuts 577
Places...**

**...13,986 Tons
of Coal Mined and
the Bits are Still Good
for More Cutting.**



The Hardest Metal Used in Mining . .

Kennametal is a tough, durable tool material that has the high hardness of 9.2 on the MHO scale as compared with the diamond's hardness of 10. Kennametal is very much harder than the hardest tool steel. In fact, Kennametal is used, by the metal-cutting industry throughout the world, to machine hardened steel. Its characteristic hardness, combined with superior compressive strength, enables it to withstand shock, resist abrasion, and take more punishment than any other tool material.

That's the performance recorded for one set of Kennametal cutting machine bits in an Ohio mine. "The bits have been resharpended five times," reports the mine superintendent, "and they are still good for plenty of cutting."

"Still good for plenty of cutting"—is what hundreds of users report, after Kennametal Bits have cut 25, 30, or 40 more places than steel bits. The ability of Kennametal Bits to stay sharp long after steel bits dull, has these important advantages:

- Bit cost per ton is reduced.
- Time and labor required for changing and spotting bits is minimized.
- Bit sharpening expense is lowered.
- Down time of cutting machine is lessened.
- Mining machine maintenance is reduced.
- Power consumption is from 10% to 50% less.
- The coal face is cut faster per place and at a constant rate.
- In 7 out of 10 cases cuttings are coarser, and there is less dust.
- Loaders and hauling equipment are kept busy.
- Tonnage per shift is increased.

Kennametal Bits are priced between 95¢ and \$1.40 each, depending upon size and quantity. At this price they are by far the most economical tools you can put in the chain, when you measure their cost against the savings they effect in materials, labor, power, and maintenance . . . and the increase in over-all mining efficiency.

Write, asking for a demonstration. Mining Division, Kennametal Inc., Latrobe, Pennsylvania.

KENNAMETAL

THE WORLD'S LARGEST MANUFACTURER OF CEMENTED CARBIDE MINING TOOLS

**LOWER
CABLE
MAINTENANCE
COSTS!**



RUBEROID INSULATING TAPE prolongs the life of valuable mining machine cables because it both repairs and fortifies. Tough and waterproof, it protects against nearly every danger of underground work. Here are the features that make it worth while to insist on this better tape—only Ruberoid gives you all seven features!

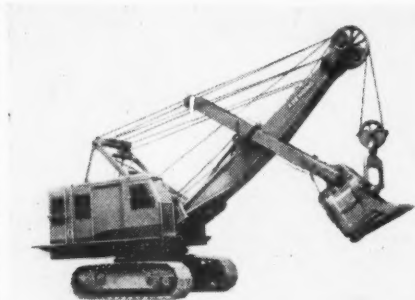
1. Double grip—both sides adhesive
2. Great tensile strength
3. Won't tear, ravel or pucker
4. Resists abrasion
5. Acid and alkali proof
6. Extra thick—one layer insulates
7. Exceeds A.S.T.M. specifications . . .

- by 300% in adhesiveness
- 26% in tensile strength
- 290% in dielectric strength!

The RUBEROID Co.

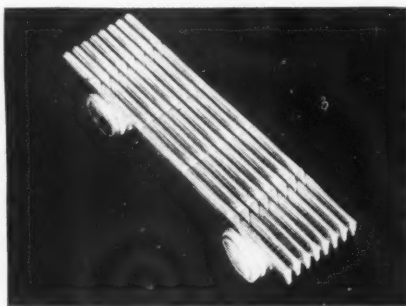
QUALITY BUILDING MATERIALS
500 Fifth Ave., New York 18, N. Y.

both talking and ringing circuits are free of electric sparks, thus making the unit safe for use in explosive areas, according to the manufacturer. It is able to withstand rough usage, wide temperature variations, humidity, corrosive fumes and shock or vibration. Communication is claimed up to 20 miles.



Excavator

A new Model 1005 excavator, marking the manufacturer's entrance into the 2½-yd. field, has been announced by the Koehring Co., Milwaukee 10, Wis. Features of the new excavator are: two-section chain crowd independent of hoist; self-equalizing 37-in. retract clutch providing speed and perfect control; 3 ft., 9 in. boom point sheaves; non-torsional shipper shaft; shock absorbers in boom foot; tapered laggings on hoist drum; instantaneous ratchet-and-pawl type dipper trip; positive traction brake steering; easily accessible one-piece turntable; and a 4-ft. power clutch equipped with compensator spring. The standard 60-ft. boom can be extended to 100 ft. with 10- and 20-ft. insert sections and the standard 30-in. crawler shoes can be replaced with 36- or 42-in. shoes on extra long crawlers.



Wedge Wire Screens

The Cambridge Wire Cloth Co., Cambridge, Md., recently announced the availability of wedge wire screens, known as "Cambri-Wedge," for washing, dewatering, classifying, etc. The screen wires are wedge-shaped and are formed into loops at regular intervals. The desired number of wedge wires are fastened together with cross rods, which are riveted or welded at the ends to make the screen rigid. The wedge shape of the wire provides longitudinal rigid-

41 MORE *Femco* TROLLEY - PHONES

**installed in mines
last month**



**CONTINUOUS
COMMUNICATION**
from mine-mouth
to face . . .

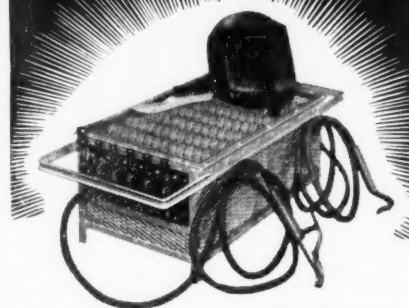
You talk in a natural voice to any moving or stationary location anywhere in the mine.

**Increases Tonnage
Promotes Safety
Speeds Operations
Improves Supervision**

Ask for demonstration

**FARMERS ENGINEERING AND
MANUFACTURING COMPANY**
549 Brushton Ave. • Pittsburgh 21, Pa.
CHurchill 5050

MESCO ARC WELDING MACHINES



SHIPPED IMMEDIATELY FROM STOCK

Here's the perfect welding machine for all types of bond welding as well as general repair work in mines where 250-275 d.c. or 500-550 d.c. is used. Both high and low styles are engineered for your convenience under any condition. Can be regulated by 20 ampere steps to full capacity of 240 amps. We also sell a complete line of accessories for electric welding.

Write today for price list.

Mosebach Electric & Supply Co.
1115 Arlington Avenue Pittsburgh 3, Pa.
HEmlock 8332

OVEN TEST COOKS UP LONGER LASTING PRODUCTS



QUAKER PRE-TESTED PRODUCTS FOR THE COAL INDUSTRY ARE PERFORMANCE-PROVED THROUGHOUT THE NATION

It may be called the "Oven Test," but to the buyer of Quaker Rubber Products it means producing rubber with the ability to withstand heavy static loads.

In making Quaker Rubber Hose it results in compounds of controlled specifications that will hold couplings over long periods of time . . . prevent hose from relaxing and allowing couplings to loosen. In packings, this pre-testing assures finished products that will hold their shape, will not relax, readily withstand pressures without the danger of blowouts.

This is only one of eighteen rigid tests that raw materials and finished products must pass before receiving the Quaker stamp of approval. Pre-testing provides quality and long service . . . assures worthwhile dividends for you through higher plant efficiency, lower operating costs. Call in your nearest Quaker distributor for hose, belting and packings.

QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA. • New York 7 • Cleveland 15 • Chicago 16 • Houston 1
Western Territory
QUAKER PACIFIC RUBBER CO. • San Francisco 10 • Los Angeles 21 • Seattle 4

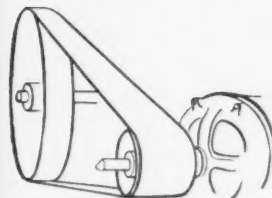


REG. U. S. PAT. OFF.

QUAKER RUBBER PRODUCTS

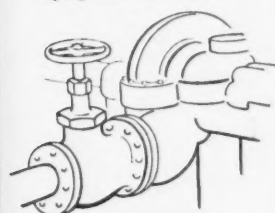
custom made for every industrial use

WHAT QUAKER Pre-Tested Products mean to the Coal Industry



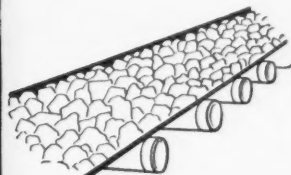
STEADY GRIP . . . LESS SLIP

Quaker V-belts and flat belting are pre-tested to provide plenty of grip, plenty of pull for more power. Pre-tested rubber stays flexible, withstands aging and abrasion.



TIGHT-SEALING OPERATION

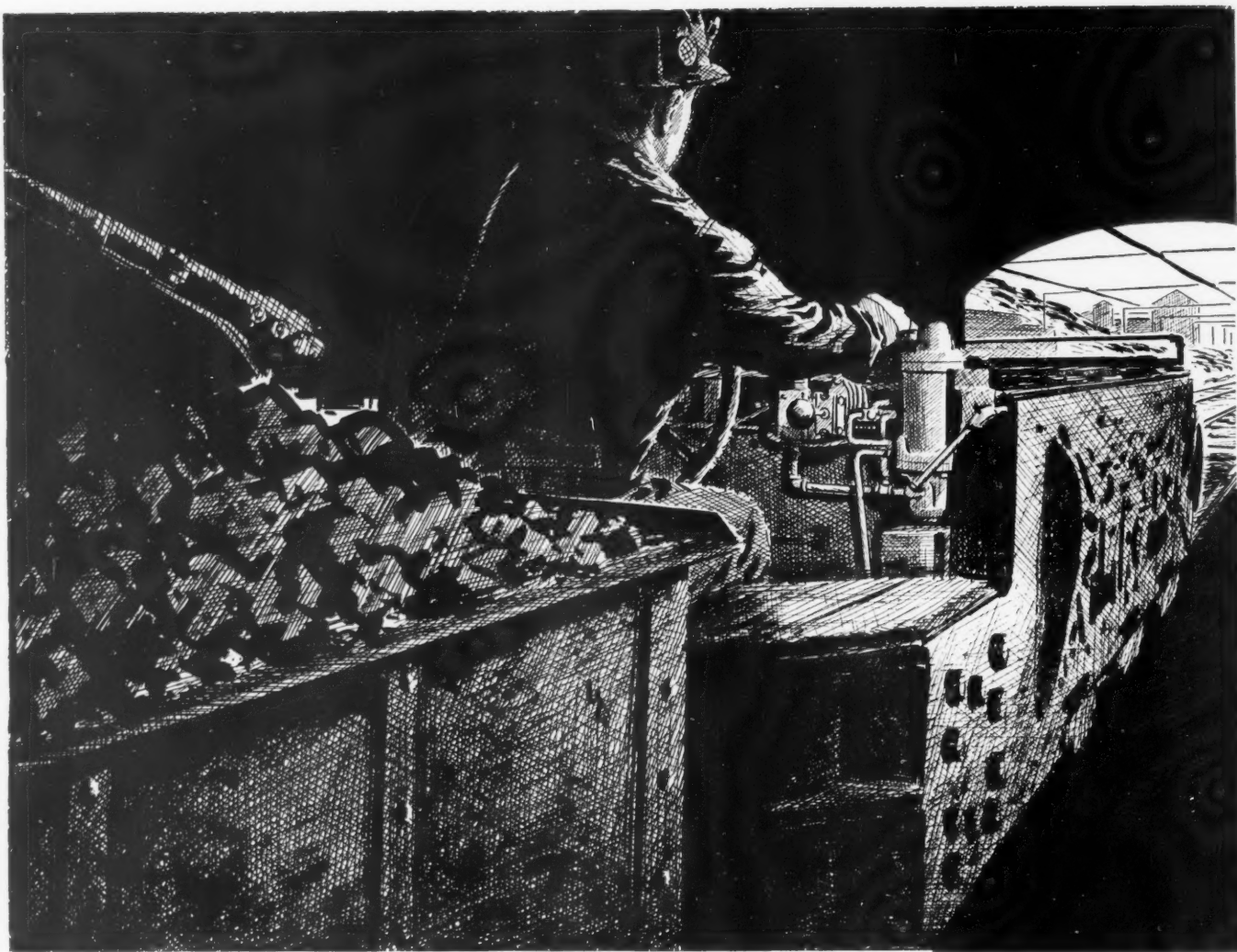
Quaker pre-tested packings for all purposes keep pressure in . . . stop leaks on valve stems, piston rods, flanges. Made of pre-tested materials for long life.



RUGGED WEAR RESISTANCE

Quaker pre-tested conveyor belting resists abrasion, stress and strain under severe loads. Rubber and cotton duck are pre-tested for toughness, long life.

•
"Visit Quaker at 1948
Metal Mining Convention
and Exposition, San Francisco—September 20th
to 23rd—Booth 700."



WHEN YOU MODERNIZED YOUR HAULAGE . . .

Did you modernize your brakes?

When you modernize your haulage equipment, just getting modern locomotives isn't enough . . . *you need modern brakes for them, too.*

On large units, this is no problem; you can use Westinghouse Air Brakes. On smaller units, where space doesn't permit an air brake installation, Westinghouse has developed a simple, compact hydraulic braking system, that gives the motor-man a responsive, dependable power brake, eliminates the hazards of hand-braking and the equipment damage of motor-bucking.

Prompt and precise control of braking pressures is obtained by positioning the brake valve, permitting quicker and more accurate spotting

of cars at loaders, higher permissible speeds on down grades, and improved safety. When locomotives are coupled in tandem, one valve controls both brake systems.

Advantages in improved operating efficiency are supplemented by savings in maintenance. One user reported brake shoe life increased from one week to three months, wheel turning decreased by half, and damage to motors and pinions (from motor-bucking) eliminated.

The compact equipment is designed for installation in limited space, can be installed when locomotives are in your shop for overhaul.

Write for bulletin SP 9092.

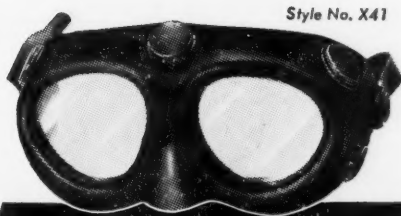


WESTINGHOUSE AIR BRAKE COMPANY

INDUSTRIAL DIVISION

WILMERDING, PA.

for New protection
against Old hazards
...get **WILLSON**



GLOVE-FIT PROTECTION AGAINST SPLASH
... This Over-All* rubber goggle with snug fitting resilient rolled edge takes the danger out of splash and spatter; provides wearing comfort over spectacles.



Style No. 731

ONE-PIECE CAP CARTRIDGE ... New chemical cartridge respirator with four interchangeable cap cartridge filters protects against low concentrations of specific vapors and gases. U. S. Bureau of Mines Approved.



SETTLE THE DUST PROBLEM ... Newly approved by Bureau of Mines for all dusts. Easier breathing over long periods provided by extra large dual throw-away filters.

*Reg. U. S. Pat. Off.

For complete information on these products and their application, as well as many more eye and respiratory protective devices, get in touch with your nearest Willson distributor or write us direct.



Style No. 750D

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS
WILLSON
PRODUCTS, INCORPORATED

ity. "Cambri-Wedge" screens can be fabricated in any length or width required, using a wide range of metals or alloys, including stainless steel. Flat and rifled surfaces are available. Chief advantage of the new-type screen, according to the manufacturer, is greater freedom from clogging.

Load-Center Transformers

Dry-type Class B insulated load-center transformers for plant power distribution circuits have been announced by Wagner Electric Corp., St. Louis 14, Mo., in the following ratings: three-phase, 60-cycle, 100 to 2,000 kva., with high voltages of 2,400, 4,160, 4,800, 7,200, 12,000, 13,200 or 14,400 and low voltages of 600, 480, 240 or 208 Y/120. All are rated 80-deg. C. rise, with natural ventilation. The transformers are housed in paneled inclosures for indoor installation. Matching compartments for primary and secondary switchgear are available to make complete unit substations. Vertical ducts through the core and vertical and horizontal ducts through the winding provide maximum ventilation and reduce internal temperatures. Insulation materials are mainly Class B but Class C materials are used where extra strength is needed.

Valve and Tool Grinder

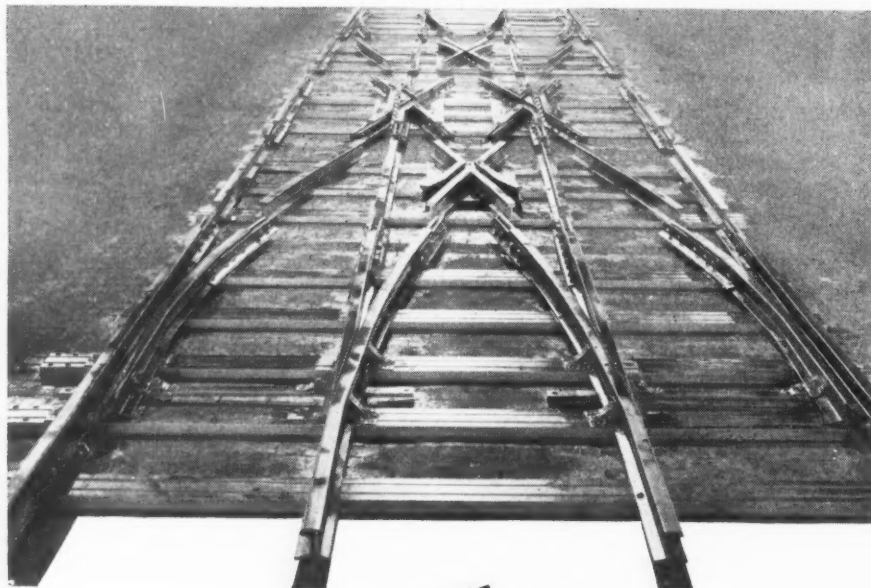
The new No. 6 Universal Valve and Tool Grinder, with a wide variety of adjustments, has been announced by The Black & Decker Mfg. Co., Towson 4, Md. Flat-head and 15-deg. valves are handled easily and quickly without special attachments or tricky adjustments, the manufacturer declares. Valve-stem capacity ranges from 1/4 to 1 1/4 in. and valve-head capacity is up to 5 1/4 in. This large capacity makes the grinder especially well suited to large diesel valves. Features include: finger-tip control of an air chuck for gripping or releasing valve stems; a controlled-speed work head motor; and a switch-slide bar which automatically controls the work head motor so that the motor runs while the valve or tool is being ground and stops when the table moves away from the wheel.

Dial Scales

Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24, Pa., has announced a new line of improved dial scales for industrial use, including scales with platforms flush with and a part of the floor surface and designed for weighing loads carried on trucks. The platform scales, completely described in the company's Bulletin P-714C, which is available on request, is built on the new out-board-bearing principle and incorporates other special features to prevent shock and eccentric loading from affecting the lever system.

SAVE MONEY

with



**WEST
VIRGINIA**

PREFABRICATED TRACK

Shown above, a complete double crossover, made up of standard West Virginia Prefabricated Track sections. Because the mine owner wanted this installation completely erected so that the track could be laid immediately, it was made up in sections. Each of these sections (clearly visible in "exploded-view" photo above) was easily lowered down the mine shaft and simply slid together on the mine bottom.

Equally efficient, time and money saving solutions to your track problems may be found through the use of West Virginia Prefabricated Track. We can supply anything in trackwork from a single tie to a complete mine layout. Contact us for competent engineering advice.

- Helps you *pre-plan* mine layout for most economic haulage.
- Goes in—and down—faster.
- Easily moved for re-use.

**WEST VIRGINIA
STEEL & MFG.
COMPANY**

HUNTINGTON, W. VA.

Electrical Wire

A new electrical wire with rubber insulation that is said to improve when soaked in water has been developed by the U. S. Rubber Co., Rockefeller Center, New York, for use underground and in wet locations where high moisture resistance gives it longer life and increased safety.

To be known as "Laytex RUW," the wire reportedly gets its durability from a coating of high-purity natural-rubber latex applied by the dip process. In addition to greater moisture resistance, the insulation of the new wire has improved tensile strength and elongation, according to the company.

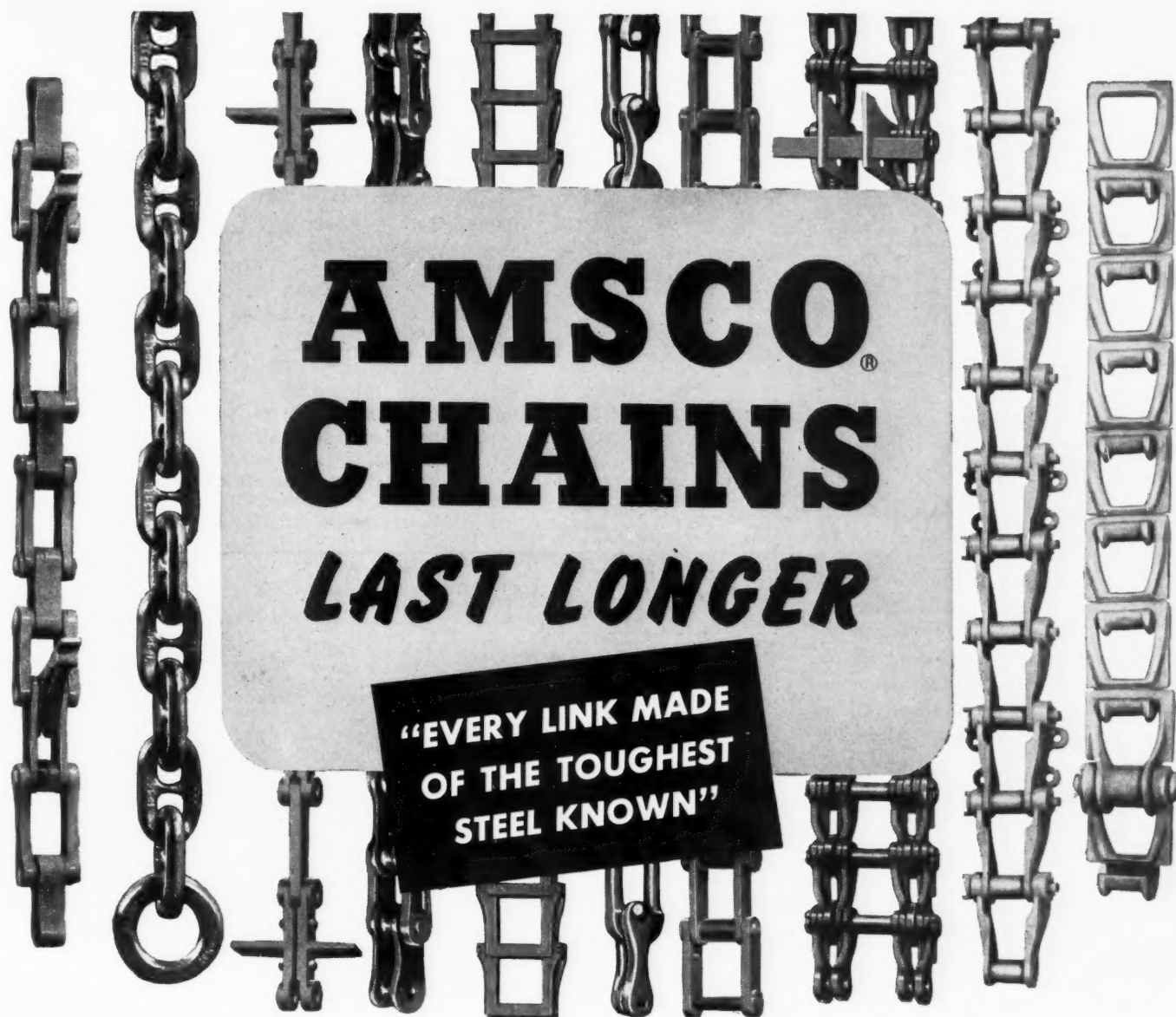
Bronze Electrode

A new silicon-bronze electrode that may be used for welding silicon-bronze base metal or copper and for joining galvanized iron and silicon bronze to steel has been announced by Air Reduction Sales Co., 60 East 42nd St., New York 17. Advantages of the new electrode, according to the manufacturer, are: soft spray-type shielded-arc action; low spatter loss; free-flowing dense deposit; easy slag removal; crack-free welds; smooth deposits; all-position welding; and ability to weld dissimilar metals. Available in 50-lb. packages, the electrode comes in five diameters ranging from 3/32 in. to 1/4 in. and varying in length from 11 to 18 in.

Combination Welder

A new welding unit that can be set for d.c. or a.c. operation by moving two switches and a lever has been announced by John A. Kern Co., 224 North Loomis St., Chicago 7. Called the Kern Dual-Tronic Combination DC-AC Welder, the machine uses rectifier tubes in a flexible mounting to supply d.c. power. Idling losses are cut 50 percent, power consumption under load is decreased and maintenance costs are reduced, the manufacturer states. Welds on light-gage metals, including stainless steel, are uniformly good because controlled low voltage eliminates excessive heating. Metal as light as 32 gage can be welded successfully. The machine's a.c. welding characteristics include smooth, instant starting and stable arc action, it is stated.

SILENT CHAIN STOCK DRIVES—Morse Chain Co., Detroit 8, Mich., has announced a new series of silent-chain stock drives including both sprockets and chains. The new sprockets have finished bores for use with Taperlock bushings, the latter being available with finished-bore diameters in increments of 1/16 in. All popular widths of Morse chain now carry a single center guide link and the company's six dual-duty sprocket face



Replacing ordinary elevating and conveying chain is a constant drain on profits . . . a constant source of production tie-ups and delays. Stop all these worries today by installing Amsco manganese steel chain in the really tough services. It often repays its own cost many times over by its tough resistance to breakage stresses and its outstanding wear resistance.

Here's the kind of service users report: 25 months with little wear versus 8 months; 27 months with 2 years' service left where ordinary chain lasted only 3 months.

With a test-bar tensile strength of 125,000 lbs. (average test), high ductility, and a surface that work hardens to as high as 550 Brinell, Amsco manganese steel chain withstands severest stresses and grinding abrasion . . . it can be used without lubrication in dust-laden atmospheres.

Added to this is the Amsco engineering design experience that will help to meet your problem with the one best chain for trouble-free service. Write for Bulletin 742-CN . . . and let us quote on your requirements.

AMERICAN

Brake Shoe

COMPANY

AMERICAN MANGANESE STEEL DIVISION

CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

MAKE UNLOADING COAL EASY

Freezeproof it with

**WYANDOTTE
CALCIUM CHLORIDE**

• Coal frozen in the car means lost delivery time and extra labor . . . dissatisfaction on the part of your dealers . . . deterioration of your product. And it's so simple and cheap to avoid all this! Just freezeproof your coal shipments with Wyandotte Calcium Chloride.

• Coal treated with Wyandotte Calcium Chloride is readily handled at the yard—even in freezing weather. It comes out of the car the same grade as when it went in—not battered, smashed or cracked. And you need no special equipment to handle Wyandotte Calcium Chloride for freezeproofing.

• Full information about this safe, dependable and economical agent for freezeproofing coal is yours for the asking. Just mail the coupon.

WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division, Dept. 1773
Wyandotte, Michigan
Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

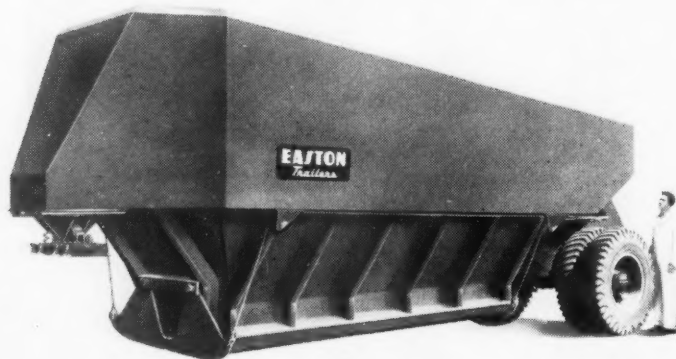
Name _____

Address _____

Title _____

 **Wyandotte**
REG. U. S. PAT. OFF.
CALCIUM CHLORIDE

WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division, Wyandotte, Michigan



NEW BOTTOM-DUMP TRAILER, Easton Model TB-4030, with a capacity of 32 tons, has been added to the line of heavy-duty off-highway trailers built by Easton Car & Construction Co., Easton, Pa. Like other Easton bottom-dump trailers, the new model has an air-powered radial gate which may be operated from the tractor cab or from the rear of the trailer. Tires are 16:00x24, 24-ply lug type and brakes are 20¼x7 in. air-powered.



EARTHMOVER—New Model 508 cable-controlled four-wheel scraper has been announced by Gar Wood Industries, Inc., Findlay Division, Findlay, Ohio. The unit is designed for use with a single tractor of 55 hp. or greater and has a capacity of 7.6 cu. yd. heaped, or 6 cu. yd. struck. Features of the Model 508 cited by Gar Wood include a deep cut, down to 12 in. below the tires; simple straight-line cable reeving that saves wear on the cable and facilitates replacements; pivoted-type bowl; fast, fully controlled dumping and spreading; high bowl clearance, and low center of gravity and three point suspension of scraper on its wheels.

widths operate with 11 stock-chain widths.

GEARS AND CRANE WHEELS—Pittsburgh Gear Co., Pittsburgh, Pa., has announced a new line of Armored gears and crane wheels for use in operations where more-than-ordinary shock and wear must be withstood. The manufacturer guarantees average life service five times that of untreated gears, one to 1½ times that of oil-treated gears and equal or superior to that of any other heat-treated gears.

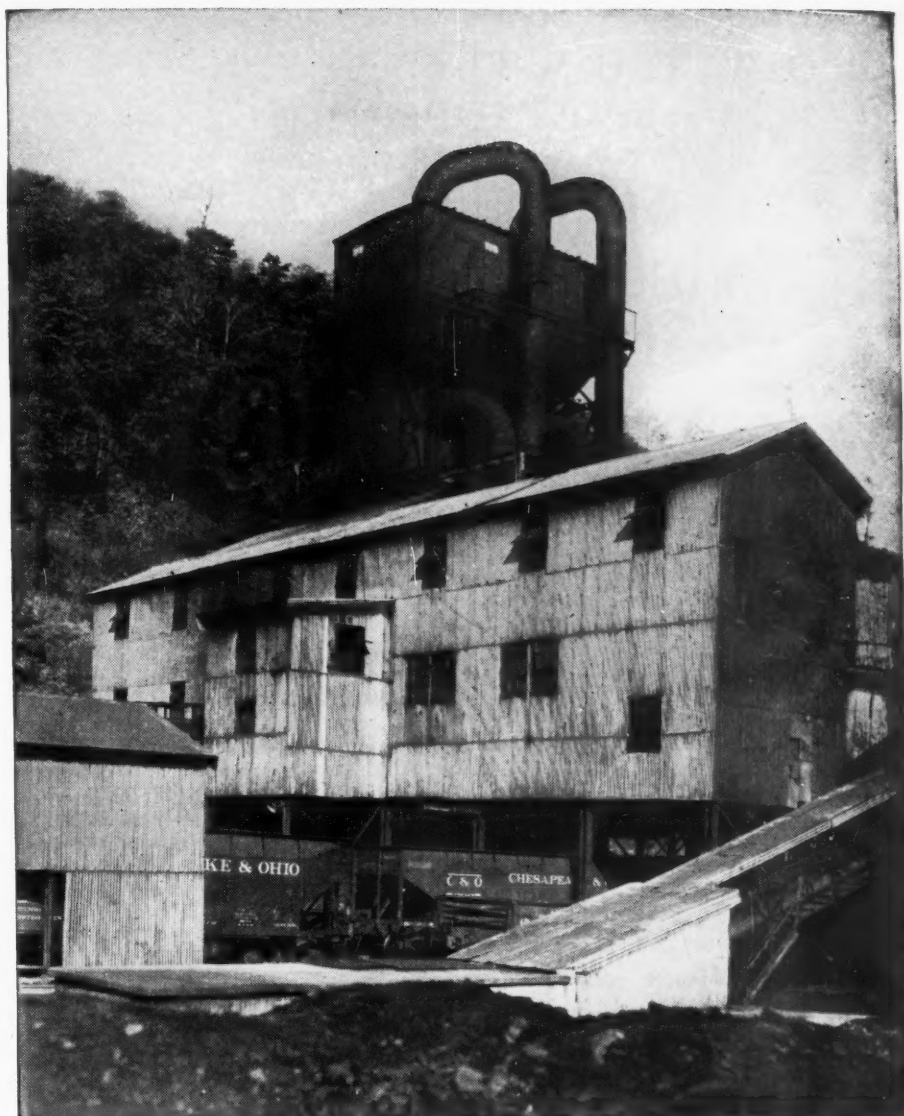
WELDING HAND SHIELD—American Optical Co., Southbridge, Mass., has made available a new lightweight seamless welding hand shield for operations where a welding helmet is not practicable and on tack welding and set-up work. Of one-piece fibre construction, the shield has a 5½-in-long handle and, without glass, weighs

only 11 oz. It is available with standard Noviweld or Filterweld glass plates.

LOADERS—Improvements in their Model HA and Model HL Payloaders have been announced by The Frank G. Hough Co., Libertyville, Ill. The chief improvement is the addition of hydraulic control as standard equipment for opening and closing the bucket, thus providing ease and speed of operation, reducing load-dumping shocks and making it possible to deposit parts of the bucket load in two or more places.

FIRE-DETECTING DEVICE—Fenwal, Inc., Ashland, Mass., has developed a new fire-detecting device for universal application over a broad temperature range and suitable for both ordinary and explosion-proof applications. "Detect-A-Fire" units, as the new device is called, can be

Pangborn Makes Coal Dust Behave



Desire for increased safety and improved working conditions—lower-cost equipment maintenance—efficient coal dust disposal and reclamation—elimination of nuisances—is responsible for the large number of Pangborn dust control installations in coal preparation plants.

For many years a “Pangborn” has been the recognized method of effectively collecting the fine coal dust that is produced in the operation of tipples, dry cleaning, de-dusting

and other coal preparation facilities.

With this background of successful experience in the coal industry, Pangborn engineers offer you an effective and economical solution to your dust problems.

Write for free Bulletin 909A, “The Control of Industrial Dust”. Address Pangborn, *world's largest manufacturer of dust control and blast cleaning equipment*, at 288 Pangborn Boulevard, Hagerstown, Maryland.

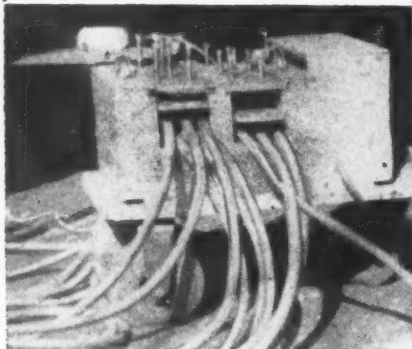
Pangborn

DUST CONTROL

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

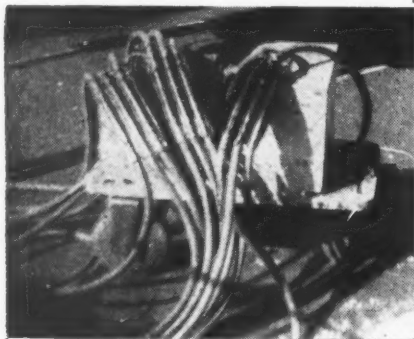
**URNS DUST LOSSES
INTO PROFITS**

LOW COST CABLE SPLICING FOR COAL MINES



All types and sizes of rubber-coated mine cable spliced and vulcanized.

Insulation on conductors is cured before outer jacket is applied and cured.



A service that helps lower your cable repair cost and assures greater safety.

Satisfaction guaranteed or you don't pay.

Write for quotations to:

CYRIL DAVIDSON
MINE CABLE VULCANIZING

Phone 3594-W

990 Arch St., Washington, Pa.



THE MODEL C TOURNAPULL, a new medium-size, high-speed, rubber-tired earthmover, recently was announced by R. G. LeTourneau, Inc., Peoria, Ill. Used with the Model E-16 Carryall Scraper, the new unit has a capacity of 13.3 cu. yd. or 16 tons. Power is provided by a 150-hp. 6-cylinder diesel engine and four forward speeds range from 2.19 to 17.3 m.p.h. Features of the new unit include: constant mesh transmission, torque proportioning differential, positive power two-speed electric steering and 21x25 tapered bead tires.

spaced at 25-ft. intervals and 12½ ft. from adjacent walls.

AIR HOSE—A new Highflex light-weight air hose for small tools has been announced by The B. F. Goodrich Co., Akron, Ohio. Advantages cited by the manufacturer are: extreme light weight, easier handling, less kinking and resistance to oil. In the ¼-in. size, the new hose weighs only 8.8 lb. per 100 ft. Working pressures go as high as 250 lb. per square inch.

ELECTRIC HOISTS—Lisbon Hoist & Crane Co., Lisbon, Ohio, has announced additional models and new 3- and 5-ton-capacity hoists to its "Bob-Cat" line. Features cited include new design, light weight, smaller over-all dimensions obtained by mounting the motor on inside of cable drum, three-section construction permitting complete and easy access, and a safety factor of six to one and better. The hoists are made entirely of steel forgings and castings, with ball-bearings throughout and gears of heat-treated alloy steel.

AIR STARTERS—A new line of air starters for gas, gasoline or diesel engines, in five sizes developing from 3 to 15 hp. on 100-lb. air pressure, has been announced by Gardner-Denver Co., Quincy, Ill. The starters feature an extremely high torque and the elimination of costly battery maintenance and replacements, according to the company.

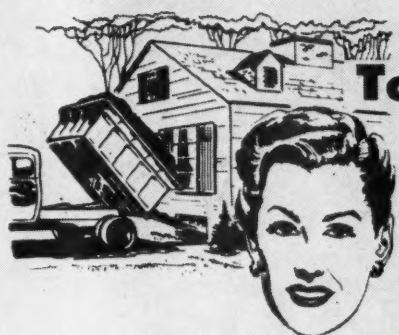
CENTRIFUGAL PUMP—A new self-powered Model FZZ centrifugal pumping unit has been announced by the Hale Fire Pump Co., Conshohocken, Pa., to meet the need for a portable, all-purpose pump. Available either with hand-carrying frame, barrow-type carriage with pneumatic tires or stationary mounting, the Model FZZ measures 20 7/16x22 5/16x25 1/4 in. Capacity is 60 gal. per minute at 90 lb. pressure and 150 gal. per minute at 30 lb.

HEAVY-DUTY AIR HOSE—Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., has announced development of Condor Homo-Flex Hose Line for air service requiring a super-tough hose. The new hose has an extra strong tube compounded of Manhattan Oil-Proof Flexlastics, two braids of heavy strength member and a thick abrasive-resistant oil-proof Flexlastics cover. Two sizes, ¾-in. and 1-in. inside, are available with working pressures up to 350 and 300 lb.




Testing mineral properties with our light gasoline drills. **SATISFACTORY COAL CORES GUARANTEED.** Ground solidification by our pre-pressure grouting method for shafts. Wetmine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA



To increase the sales of good coal

Preparation should include

**FREEZE
PROOFING**

**LESS
WINDAGE
LOSS**

**DUST
PROOFING**

**BETTER
STOKER
FEED**

**CLEAN
HANDLING**

**PERMANENT
ODORLESS
TREATMENT**



with **PERMATREAT Coal Spray**

You can offer customers who buy good coal extra value and lasting satisfaction when you treat your coal with Permatreat Coal Spray. Applied at the mine with modern, efficient spray equipment, it gives lasting protection from mine to user as rain will not wash it away. It protects from dust, freezing and windage loss until the last piece is burned.

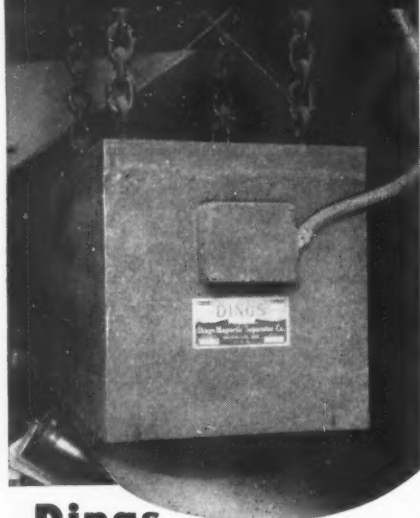
Permatreat coal spray is carefully refined and treated to be practically odorless.

Ashland field men will gladly help you in selecting the correct equipment and oil for your operation. Write today.



**ASHLAND OIL
& REFINING COMPANY**
Ashland, Kentucky

HEAVY DUTY IRON REMOVAL

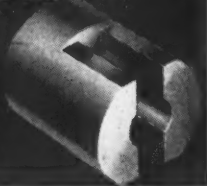


Dings Rectangular Magnets

Put Dings "High Intensity" Rectangular Magnets over heavily-loaded conveyor belts. Tramp iron is snapped up out of the coal burden... positively protecting your equipment and your customers' stokers. Dings Rectangular Magnets put down a uniform, powerful magnetic field across the entire belt width... Dings design makes a magnet wider than the belt unnecessary... Get complete details on heavy-duty iron removal from Dings today.

NEW! DINGS

Magnetic Drill Extractor



A powerful Alnico Magnetic Drill Extractor to save redrilling blast holes when drill rod or bits break off in the hole. Dings Extractors lift up 25 to 40 times their own weight... Easy to use... Can be carried in a pocket... Write for data sheet containing complete information.

DINGS MAGNETIC SEPARATOR CO.

4720 W. McGeogh Ave., Milwaukee 14, Wis.

Dings

"HIGH INTENSITY"

SAFETY BOOT—A new-type 10½-in. high safety boot patterned after combat boots worn by the armed forces has been announced by Iron Age Division, H. Childs & Co., Inc., Pittsburgh 22, Pa. A buckle top facilitates removal and permits pants cuffs to be tucked inside. Concealed steel safety toe boxes provide protection against injury. The boot is made of soft oil-tanned brown leather with outside garrison counters for reinforcement, and has a heavy, double-stitched outsole, full leather middle sole, lined vamp and steel arch.

MASONRY DRILLS—Carbide-tipped masonry drills for use on concrete, brick, stone, tile, marble, etc. have been made available by Holub Industries, Inc., Sycamore, Ill. Called "Hi" drills, they are designed for electric rotary or breast drills. Sizes range from 11/64 in. to 1½ in. diameter.

HELICAL ROTOR PUMP—The Syntron Co., Homer City, Pa., has announced a line of positive-displacement helical rotor pumps. Two helical rotors, one driving and the other idling, force the liquid ahead in an axial flow in volume and at pressure. The driving-rotor shaft is sealed against leakage. Built in two sizes, the pumps handle various grades of oil at either 50 or 75 g.p.m. at pressures up to 125 lb. per square inch.

TOUCH-UP TINNING PENCIL—Rustproofing metal, reglazing spots, tinning bearings and other operations can be done quickly with the new "Kromover" touch-up pencil recently announced by All-State Welding Alloys Co., Inc., 96 W. Post Road, White Plains, N. Y. The pencil goes on at 450 deg. F. and can be applied with oxy-acetylene, air-acetylene or city-gas flame.

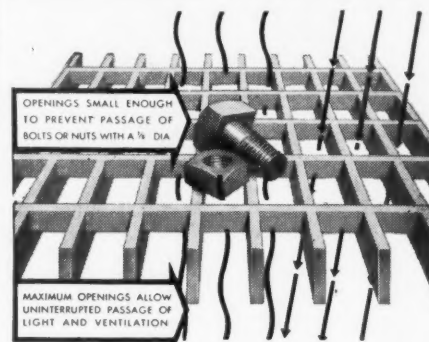
Industrial Notes

Rockbestos Products Corp., New Haven, Conn., has named Fred S. Bacon Jr. as assistant general sales manager with responsibility for general sales, advertising and sales promotion. Mr. Bacon formerly was manager, Central Station Division, Westinghouse Electric Corp., Boston, Mass.

General Electric Co. has announced the election of R. I. Parker as a commercial vice president, succeeding W. O. Batchelder, who retired July 1. Mr. Parker, with headquarters in Chicago, will have charge of customer relations in Illinois, Michigan, Wisconsin, Minnesota, Iowa, eastern Nebraska, Kansas, Missouri and western Tennessee. Since 1945, the new vice president has been manager, Apparatus Department, Central District.

Nelson H. Davis Co., Chicago, has

TRI-LOK RECTANGULAR OPEN STEEL FLOORING



Tri-Lok strength is obtained by truss action through twisted cross-bar, curved in opposite directions at each bearing-bar. Standard openings in Tri-Lok Rectangular Steel Flooring are 1" x 3⅞"—other size openings can be supplied as required.

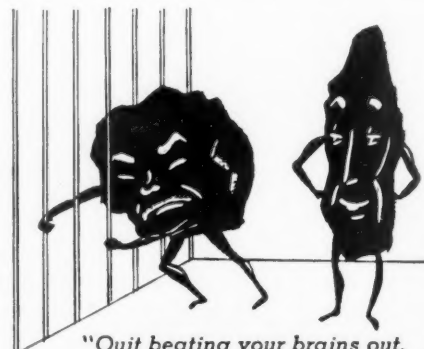
Diagonal, or Super-Safety U-type Flooring, and stair treads of all types, are available. Bulletin KJ 1140 describes the construction features of Tri-Lok Open Steel Flooring.

DRAVO CORPORATION

National Distributor for the
Tri-Lok Company

Dravo Bldg., Pittsburgh 22, Pa.

Sales Representatives
in Principal Cities



"Quit beating your brains out, Fatty... even I can't get through a BEE-ZEE screen."

KEEP COAL FROM ESCAPING WITH BEE-ZEE SCREENS

Save your coal from slipping away—by using Bee-Zee long-life screens on every job. Round bar construction keeps the opening size always the same until the bar is worn halfway through. That gives you longer screen life—big coal savings. Look into Bee-Zee screens now. It pays!



**BIXBY-ZIMMER
ENGINEERING CO.**
961 Abingdon St., Galesburg, Illinois

Compare NEW DODGE "Job-Rated" TRUCKS feature for feature!



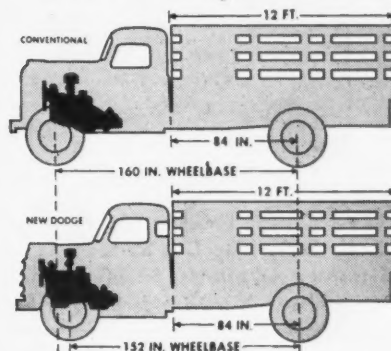
Read this 10 Point Comparison

(Dodge Model F-152; 14,500 pounds Gross Vehicle Weight—and Comparable Competitive Models.)

FEATURES AND ADVANTAGES	DODGE "Job-Rated" TRUCK	TRUCK "A"	TRUCK "B"	TRUCK "C"	TRUCK "D"
Wheelbase	152 in.	161 in.	158 in.	159 in.	161 in.
Cab-to-Axle—to take 12-foot body	84 in.	84 in.	84.06 in.	84 in.	84 in.
Wide-Tread Front Axles (shorter turning—more stability)	62 in.	56 in.	60.03 in.	58½ in.	56 in.
Modern "Cross-Type" Steering	Yes	No	No	No	No
Turning Diameter * —Left —Right	50½ ft. 50½ ft.	61½ ft. 61½ ft.	60½ ft. 54½ ft.	54½ ft. 54½ ft.	66½ ft. 66½ ft.
Maximum Horsepower	109	93	100	93	100
Total Spring Length (Front and Rear "Cushioned Ride") †	194 in.	171½ in.	162 in.	176 in.	182 in.
Cab Seat Width (Measure of Roominess) ‡	57¼ in.	52¼ in.	51½ in.	47½ in.	52¼ in.
Windshield Glass Area ▲	901 sq. in.	713 sq. in.	638 sq. in.	545 sq. in.	713 sq. in.
Vent Wings plus Rear Quarter Windows	Yes	No	No	No	No

* To outside of tire (curb clearance). Computed from data based on tests or computations obtained from usually reliable sources. † All four springs. ‡ Measured from production models. ▲ Computed from width and depth measurements; no allowance for contours.

Better Weight Distribution Easier Handling Shorter Turning Diameters

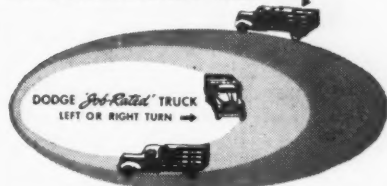


Front axles have been moved back, engines forward, placing more load on the front axle. While cab-to-axle dimensions are the same, wheelbases are shorter, giving better weight distribution, and increased payload.

This new weight distribution, combined with longer springs, produces a marvelous new "cushioned-ride."

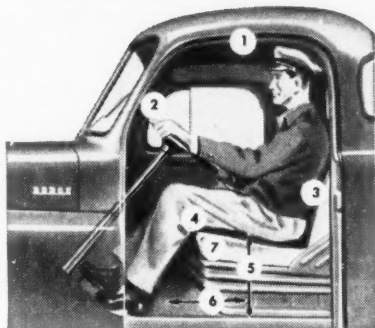
You get still more comfort from new "Air-O-Ride" seats, with their easily controllable "cushion of air."

CONVENTIONAL LEFT TURN



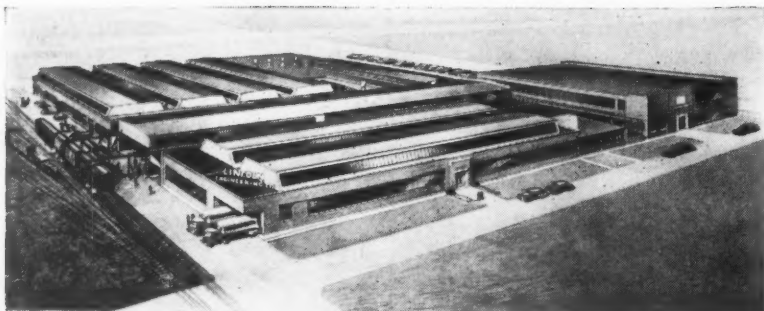
CONVENTIONAL RIGHT TURN

You can turn in much smaller circles, both right and left—you can back up to loading platforms or maneuver in crowded areas with greater ease—because of new type "cross-steering," shorter wheelbases, and wide tread front axles. In all, 248 different "Job-Rated" chassis and body models. Up to 23,000 lbs. G.V.W. Up to 40,000 lbs. G.T.W.



- 1—PLENTY OF HEADROOM.
- 2—STEERING WHEEL... right in the driver's lap.
- 3—NATURAL BACK SUPPORT... adjustable for maximum comfort.
- 4—PROPER LEG SUPPORT... under the knees where you need it.
- 5—CHAIR-HEIGHT SEATS... just like you have at home.
- 6—7-INCH SEAT ADJUSTMENT... with safe, convenient hand control.
- 7—"AIR-O-RIDE" CUSHIONS... adjustable to weight of driver and road conditions.





Lincoln Completes Fourth Plant Addition

NEW MODERN two-story administration building is the fourth addition to the plant of the Lincoln Engineering Co., St. Louis, Mo. (above). The new building adds 34,000 sq. ft. of floor space and provides for enlarged administrative facilities, a display room, service school, salesmen's training facilities and a completely equipped demonstration room.

cut
**VENTILATION
COSTS**
with



VINYL PLASTIC COATED MINEVENT TUBING

Greater-than-ever tubing life
and more economical ventilation

tion is yours with this new development in MineVent Tubing. A.B.C. research and adaptation of the valuable properties of vinyl plastic compounds bring you a flexible tubing with these four exclusive advantages.

FLAMEPROOF: The only mine ventilation tubing that is flameproof by actual test.
WEAR RESISTANT: Vinyl Plastic Coated MineVent Tubing has proved highly resistant to wear by authoritative abrasion, scrub, flex-and-fold tests.

MILDEW PROOF: As demonstrated by actual soil burial tests. Impervious to moisture and water. Resists action of chemicals; alkalis and diluted acids.

LIGHT WEIGHT: Easier to handle, install and take down. Saves on shipping costs.



Vinyl Plastic Coated MineVent Tubing is ready to save money for you. Send for Bulletin 107 and ask for sample. Put it to any test.

AMERICAN BRATTICE CLOTH CORP. WARSAW, INDIANA

MORE HAULAGE FOR 20% LESS BATTERY CAPACITY

Double knee-action; better trackability. Floating power; less power consumption. Quick acting footbrake—essential for quick stopping, especially behind leading machines. Brake shoes that follow wheels (due to knee-action). Adjustable Timken Bearings throughout.



Huskiest transmission in any storage battery locomotive. Oil-tight; leakproof. Use regular auto oil; change every 6 months. Strong. Simple design. Low maintenance cost. Backed by over 25 years of experience with Storage Battery locomotives.

GREENSBURG "MONITOR"

Franklin County Coal Corporation at Royalton and Herrin, Illinois, have 12 of our Monitor type, storage battery locomotives.

All Greensburg Locomotives are CUSTOM-BUILT to your requirements

THE GREENSBURG MACHINE CO. 101 STANTON ST. GREENSBURG, PA.

announced that S. M. Parmley, coal preparation engineer, has joined its staff as consulting engineer.

Timken Roller Bearing Co., Canton, Ohio, has elected Whitley B. Moore vice president in charge of sales, succeeding L. M. Klinedinst, who recently retired. For the past three years, Mr. Moore was director of all sales and prior to that had charge of the company's steel sales division. Mr. Klinedinst will maintain his connection with the company as a director and consultant on sales.

Jeffrey Mfg. Co., Columbus, Ohio, has purchased the capital stock of the Case Crane & Kilbourne Jacobs Co., of the same city. Located adjacent to the Jeffrey plant, the newly-acquired firm will operate as a subsidiary of the Jeffrey Mfg. Co. without changes in management or policies. The Jeffrey Mfg. Co. has leased three buildings in the new set-up to enlarge its manufacturing facilities.

Westinghouse Electric Corp., Pittsburgh, has named J. R. Fulton manager of the mining section of its industrial sales department. A graduate of James Milliken University, Mr. Fulton was located in Westinghouse's Chicago sales office for 13 years and since 1937 has been at East Pittsburgh in various positions with industrial, marine and aviation sales responsibility.

Ansul Chemical Co., Marinette, Wis., has appointed Franklin Wedge assistant to the president. Mr. Wedge, who has been associated with Ansul for 18 years, was formerly eastern manager of the company.

Chain Belt Co., Milwaukee, has opened a new district sales office at 2900 West Clay St., Richmond 21, Va., with Fred W. Taylor, district manager, in charge. Mr. Taylor, who was with Chain Belt from 1936 to 1946, as district manager of the Atlanta office, rejoined the company this year.

Rockbestos Products Corp., New Haven, Conn., has appointed Fred S. Bacon Jr., assistant general sales manager.

Thew Shovel Co., Lorain, Ohio, has named as general sales manager M. B. Garber, formerly assistant sales manager and export manager, to succeed the late Don G. Savage. Mr. Garber, who has been associated with Thew for 21 years, immediately announced the appointment of Q. T. Winsor and J. T. Cushing as assistant general sales managers. Mr. Winsor previously was assistant to the general sales manager and district sales manager for the East-Central territory, and Mr. Cushing district sales manager for the West Coast.

Hardinge Co., York, Pa., has named Robert J. Russell secretary of the company and chief of its technical staff. Mr. Russell first joined Har-



BIG NEWS!

A new booklet gives you

"Facts you should know about

HARDFACING ALLOYS"

Send for your free copy, TODAY!

This NEW, FREE booklet by Airco gives you authentic, understandable information for combating wear — caused by abrasion, impact, heat and corrosion.

Here, you will get facts essential for increasing the service life of new parts, and restoring worn parts for additional service. In part, this definitive, profusely illustrated booklet gives you:

- A handy, easy-to-understand guide for selecting the proper alloy for the proper wear retarding job.
- A Hardness Conversion Table.
- A Preheating Chart.
- A FULL description, and explanation, of Airco's NEW line of Hardfacing Alloys, with specification data, application technique, deposit hardness, color markings and deposit analysis.

If you are interested in increasing the service life of your equipment from 2 to 25 times, fill in and mail the coupon below for a copy of this NEW booklet. Air Reduction, 60 East 42nd Street, New York 17, N. Y. On West Coast: Air Reduction Pacific Company, San Francisco 4, California. Represented Internationally by Airco Export Corporation.

ALSO — FOR ONLY \$2.95 — YOU CAN GET A TRIAL ASSORTMENT OF AIRCO'S NEW LINE OF HARDFACING ALLOYS . . . A SPECIAL OFFER, AVAILABLE FOR A LIMITED TIME ONLY.



AIR REDUCTION

Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories



**MAIL THIS COUPON TODAY FOR YOUR FREE COPY OF
AIRCO'S DEFINITIVE HARDFACING BOOKLET**

CA

Air Reduction, 60 East 42nd Street, New York 17, N. Y.

☐ Send me a copy of Airco's New Hardfacing booklet — at NO cost to me.

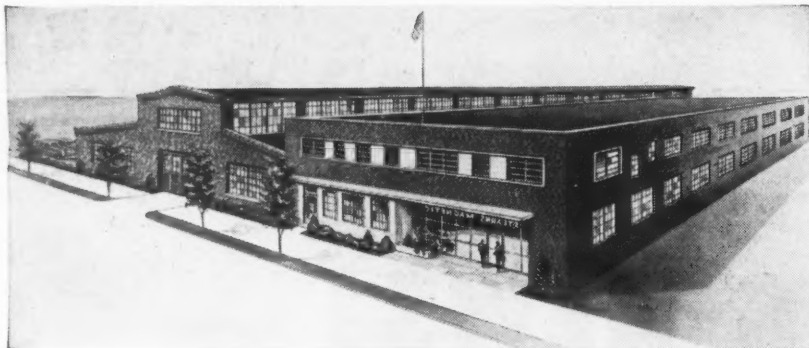
☐ Here is my check for \$2.95 — send me the special package of Airco's Hardfacing Alloys.

Firm _____

Signed By _____

Address _____

City & State _____



Stearns Magnetic Adds to Plant

A MODERN ADDITION to its plant has been erected by Stearns Magnetic Mfg. Co., Milwaukee, Wis., to meet demands on its facilities as a result of increased production. A fully equipped research and testing laboratory is provided for on the ground floor and administrative and engineering offices are located on the second floor.

dinge in 1929 as service engineer and in recent years has specialized in design and development of wet and dry grinding systems.

Western-Knapp Engineering Co., New York, has named G. Donald

Emigh manager of its eastern district. Mr. Emigh formerly was mining engineer and geologist for the U. S. Vanadium Corp.

Kelso-Burnett Electric Co., Chicago, has announced as a new service

for the coal industry engineered electrical construction, complete from the inception through engineering to construction. The new service is in charge of E. T. Groat, who recently joined the firm as vice president after 26 years with General Electric, and covers new projects, conversions or alterations. It is available directly to the coal industry or through engineering firms or general contractors.

Trade Literature

Available Without Charge on Request to the Manufacturer

WIRE ROPE WALL CHART—R. G. LeTourneau, Inc., Peoria, Ill. The new Tournarope Wall Chart, Form N-109, lists design and production features of Tournarope, types and constructions, applications and cable requirements for LeTourneau scrapers, dozers, cranes and rooters.

SOLENOID CONTACTORS—Ward Leonard Electric Co., 31 South St., Mt. Vernon, N. Y. Bulletins Nos. 4452 and 4453 describe new Sizes 2 and 3 a.c. solenoid contactors and list standard and optional features, construction details and applications.

LOW-HEAT WELDING—Eutectic Welding Alloys Corp., 40 Worth St., New York 13. "Illustrated Production Issue, EW-7" explains the uses and features of 15 Eutectic alloys and the advantages of low-heat welding. Detailed instructions are given for the use of every welding alloy described.

MAGNETIC SEPARATORS—Eriez Mfg. Co., 92 East 12 St., Erie, Pa. Catalog No. 12 describes the complete line of Eriez permanent non-electric magnetic separators and gives specifications on weights, sizes and strength comparisons for various types of plate magnets, as well as tables of operating capacities for permanent magnetic pulleys, drums, pneumatic line assemblies and pipeline traps.

ELECTRODES—Page Steel & Wire Division, American Chain & Cable Corp., Monessen, Pa. Booklet DH 45, "Page Hard-Surfacing Electrodes," describes the company's manganese, high-carbon and medium-carbon electrodes, shielded-arc and bare.

FLEXIBLE COUPLINGS—Ajax Flexible Coupling Co., Inc., Westfield, N. Y. Catalog No. 48 contains complete data on the company's flexible couplings, including standard Types S and A as well as shear-pin, brake-drum, bolt-on and detachable hub couplings.

MINE EQUIPMENT—National Mine Service Co., Beckley, W. Va.; Logan, W. Va.; Jenkins, Ky.; and Forty Fort, Pa. "National Stock Report" is a listing, available each month, of mine supplies, replacement parts and equipment obtainable from any one of the company's four warehouses, listed above.

CRANE WHEELS—Pittsburgh Gear Co., Pittsburgh 22, Pa. Booklet describes the company's new line of Armored crane wheels with extra-hard treads and flanges and shock-proof cores.

DRIVE CHAINS—The Jeffrey Mfg. Co., Columbus 16, Ohio. Catalog No. 808 contains 60 pages of information on steel - thimble roller - drive chains. Photographs reproduce the exact pitch of every chain and show views of applications as well as interior plant views.

PROFESSIONAL SERVICES

ALLEN & GARCIA CO.

ENGINEERS AND BUILDERS OF
MODERN COAL OPERATION

Authoritative Valuations, and Reports of
Mining Properties Equipment and Operation.

332 S. Michigan Ave., Chicago
120 Wall Street, New York, N. Y.

HERBERT S. LITTLEWOOD

CONSULTING ENGINEER

Application — Supervision of Installation
Maintenance - Inspection - Testing

POWER-HAULAGE-HOISTING-VENTILATION

1104 South Braddock Avenue, Pittsburgh 18., Pa.

F. CARL COLCORD

CONSULTING ENGINEER

COAL LAND VALUATIONS
MINE INSTALLATIONS AND
OPERATION

BOX 268, PARIS, KY.

Phone 327W

C. C. MORFIT & ASSOCIATES

Consulting Engineers

11 Broadway, New York 4, N. Y.
Cable Address Mandmetal, New York

EAVENSON & AUCHMUTY

Mining Engineers

COAL OPERATION CONSULTANTS
VALUATION

2720 Koppers Bldg.

Pittsburgh 19, Pa.

K. PRINS & ASSOCIATES

Engineers and Consultants

Designers of low cost coal preparation plants,
Tipples and structures.

THE PRINS COAL WASHER

Wellston

Ohio

HENRY O. ERB

Coal Preparation Consultant

PLANT DESIGN AND OPERATION

1018 So. 8th St.

Terre-Haute, Ind.

TEMPLETON-MATTHEWS CORPORATION

Designing Engineers—Consultants—Builders

MODERN COAL PREPARATION PLANTS THRU

"CO-OPERATIVE ENGINEERING"

906-06 Sycamore Bldg.

Terre Haute, Indiana

J. H. FLETCHER

39 Years

Continuous Consulting Service
to Coal Mines

Telephone Harrison 5151

McCormick Building

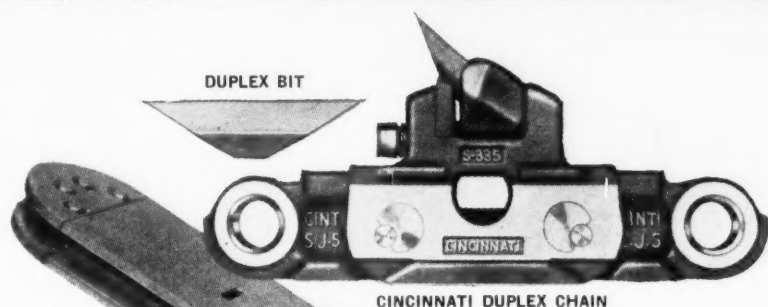
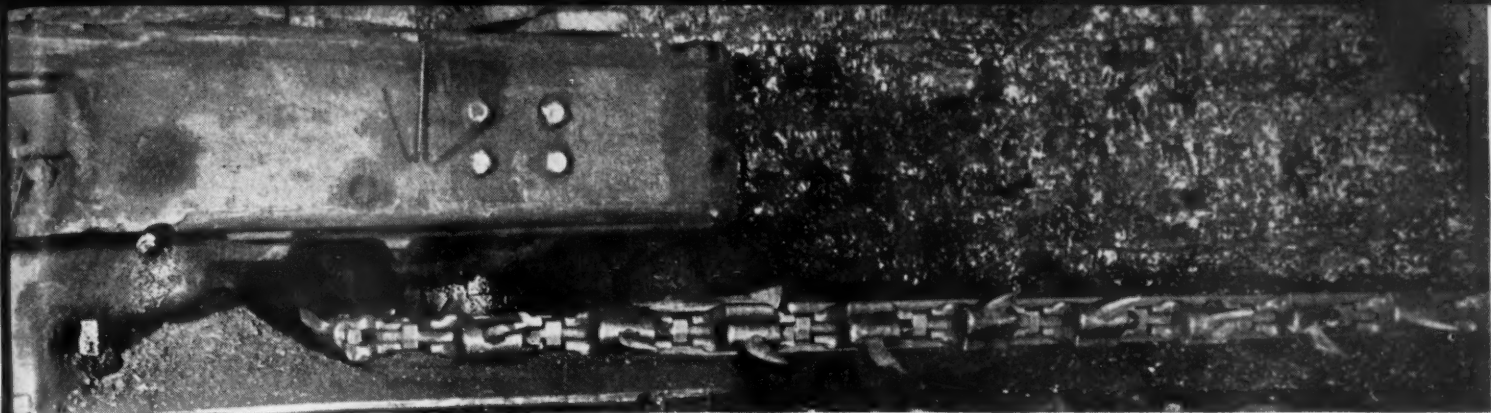
Chicago, Illinois

L. E. YOUNG

Consulting Engineer

MINE MECHANIZATION
MINE MANAGEMENT

Oliver Building — Pittsburgh, Pa.



CINCINNATI Chains Bits and Bars Used in America's Foremost Mines

Cincinnati Coal Cutting Equipment such as illustrated above is performing with maximum efficiency in an ever increasing number of mines in this country and abroad. Illustrated is a Cincinnati No. 6 Thin Kerf Chain and Cincinnati No. 2353-A Thin Kerf Cutter Bar operating in 26" to 28" coal seam.

OUR BEST ADVERTISING COMES FROM OUR CUSTOMERS

TOP PERFORMANCE of Cincinnati Coal Cutting Equipment year after year in Mine after Mine in this country and abroad has built more new business and more repeat business than anything we might say. We want to take this opportunity, however, to point out that Cincinnati Coal Cutting Equipment is well engineered and ruggedly constructed . . . that it uses less power . . . increases production . . . provides larger cuttings . . . and decreases machine maintenance costs. Summarizing expressions from our customers, the Cincinnati Chain is virtually trouble-free and is popular with management, machine runners and maintenance men.



Cincinnati Bars are specially designed to operate under all cutting conditions and will fit all types of cutting machines.

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO

"PANORAM"

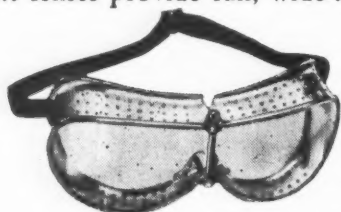


...an inspired name for a wide-vision
SAFETY GOGGLE

**...and this AO Product is
better than its Name!**

This popular plastic goggle pleases both the worker who seeks sure protection *over* his prescription glasses and the man who needs protective goggles *only*. The *replaceable* lenses provide full, wide-angle vision and

with the lightweight frames, may be had either clear or in green acetate. There's overall comfort in frames closely conforming to forehead and face . . . a bridge which fits any nose without irritation or pressure . . . eyecups vented to reduce fogging of lenses. Your nearest MSA Representative can give you full information about the Panoram Goggle for combating hazards common to chipping, grinding, riveting and similar operations.



American  Optical

COMPANY

Safety Division

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL INDUSTRIAL CITIES

National **HOMES** **for INDUSTRIAL HOUSING...**

PRICE RANGE
from \$3,000 up

● Place your housing problem in the hands of National Homes Corporation for the solution you want — an immediate one assuring long-term satisfaction. We erect houses on any location in any number for families of varying earning power. Optional features (such as porches, garages, type of heating, extent of plumbing and wiring, etc.) make houses available in price ranges you can afford. NATIONAL HOMES provide comfort and convenience at least expense. Our field construction crew, trained in efficiency, erects the houses complete and ready for occupancy.

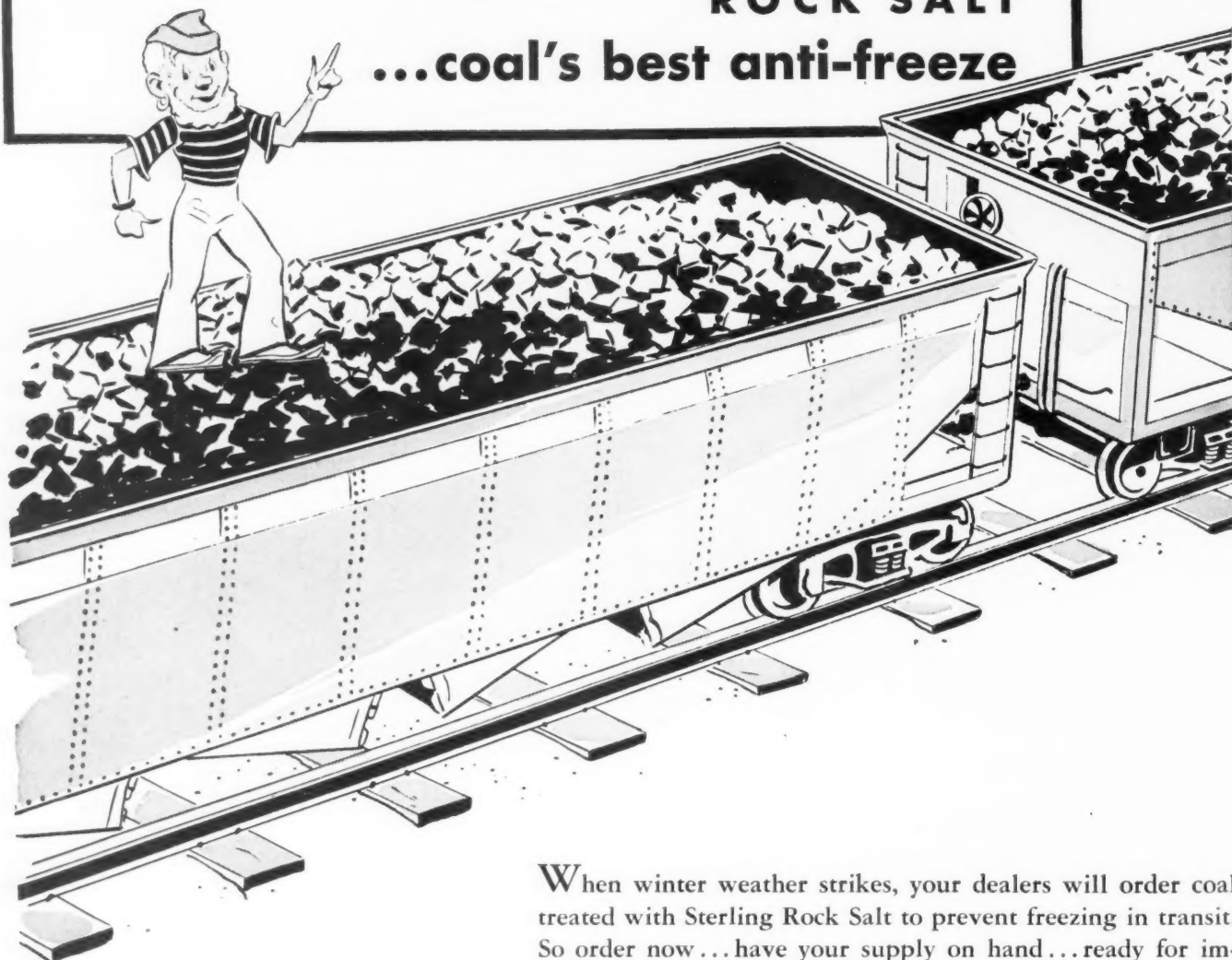
NATIONAL HOMES CORPORATION
LAFAYETTE, INDIANA, U. S. A.



● Write us for literature giving complete details on National Homes Industrial Housing. Over 13,000 National Homes Now In Use.

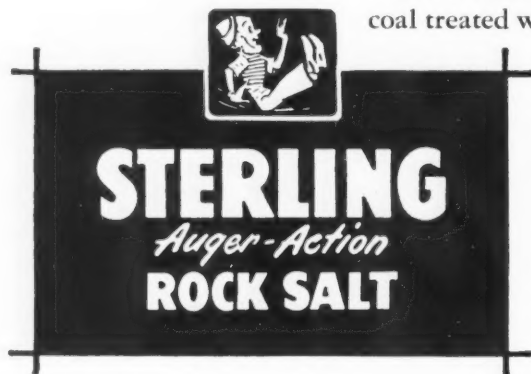
STOCK UP NOW on **STERLING** ROCK SALT

...coal's best anti-freeze



When winter weather strikes, your dealers will order coal treated with Sterling Rock Salt to prevent freezing in transit. So order now...have your supply on hand...ready for immediate application on demand.

Free-running coal helps solve the winter fuel problem...for coal treated with Sterling Rock Salt unloads easily and quickly...eliminates the delay and expense in thawing cars of frozen coal...speeds the return of badly needed cars to the mine.



Sterling Rock Salt helps at the colliery too. Spread on roads, scales, tracks, platforms, Sterling "Auger-Action" Rock Salt removes ice and snow that are often the cause of serious accidents and delay. Shipped in carloads of bulk or 100 lb. bags.

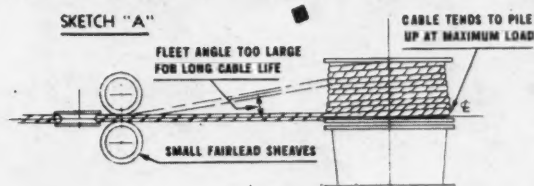
GET ALL THE FACTS!

Write today for our bulletin: "Pass the Salt...to keep coal from freezing."

INTERNATIONAL SALT COMPANY, INC.
Scranton, Pa.

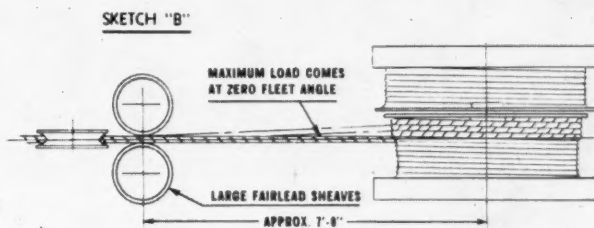
Look at a LIMA Dragline

from these angles



1. Proper fleet angle is an important factor in cable life: the smaller the angle, the less the wear on cable by flanges of the sheave. Sketch "A" at right, shows a common method of cable reeving where large fleet angle and piling at maximum load cause excessive cable wear. Sketch "B" shows the LIMA method, achieving small fleet-angle—with zero angle at maximum load, by proper placement of drum with relation to fairlead and large diameter drums with short traverse. Cable wear is further protected by large, deep throated sheaves and grooved drums.

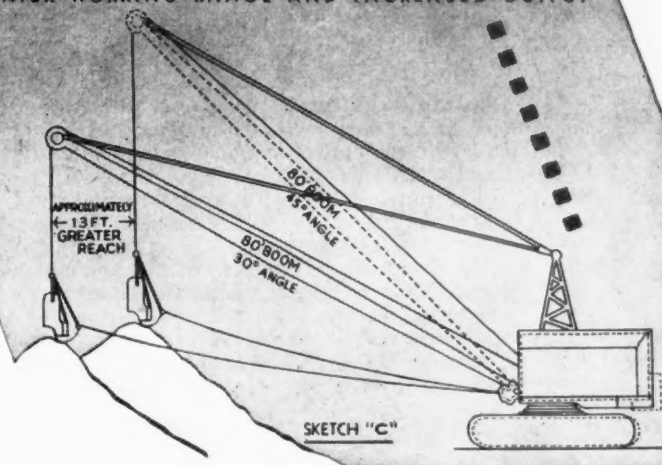
1. SMALL FLEET ANGLE OF THE FAIRLEAD CABLE MEANS LONGER LIFE AND LESS DOWN TIME



2. Sketch "C" illustrates how a well balanced LIMA dragline with 80 foot boom, working at 30° angle, achieves 13 feet greater reach than a light weight machine with same length boom, but which cannot go lower than 45° without tipping.

LIMA draglines have low center of gravity, proper weight distribution and long wide crawlers—all contributing to lower possible work angle of boom and greater working ranges.

2. LOW WORK ANGLE OF THE BOOM MEANS GREATER WORKING RANGE AND INCREASED OUTPUT



LIMA draglines are designed and built for dragline work. Every part is engineered for greatest output with minimum maintenance. Sizes and capacities for practically every requirement. Get all the facts before you buy your next dragline . . . LIMA also makes power shovels from $\frac{3}{4}$ to 6 yards and cranes from 13 to 100 tons.

Lima Shovel and Crane Division

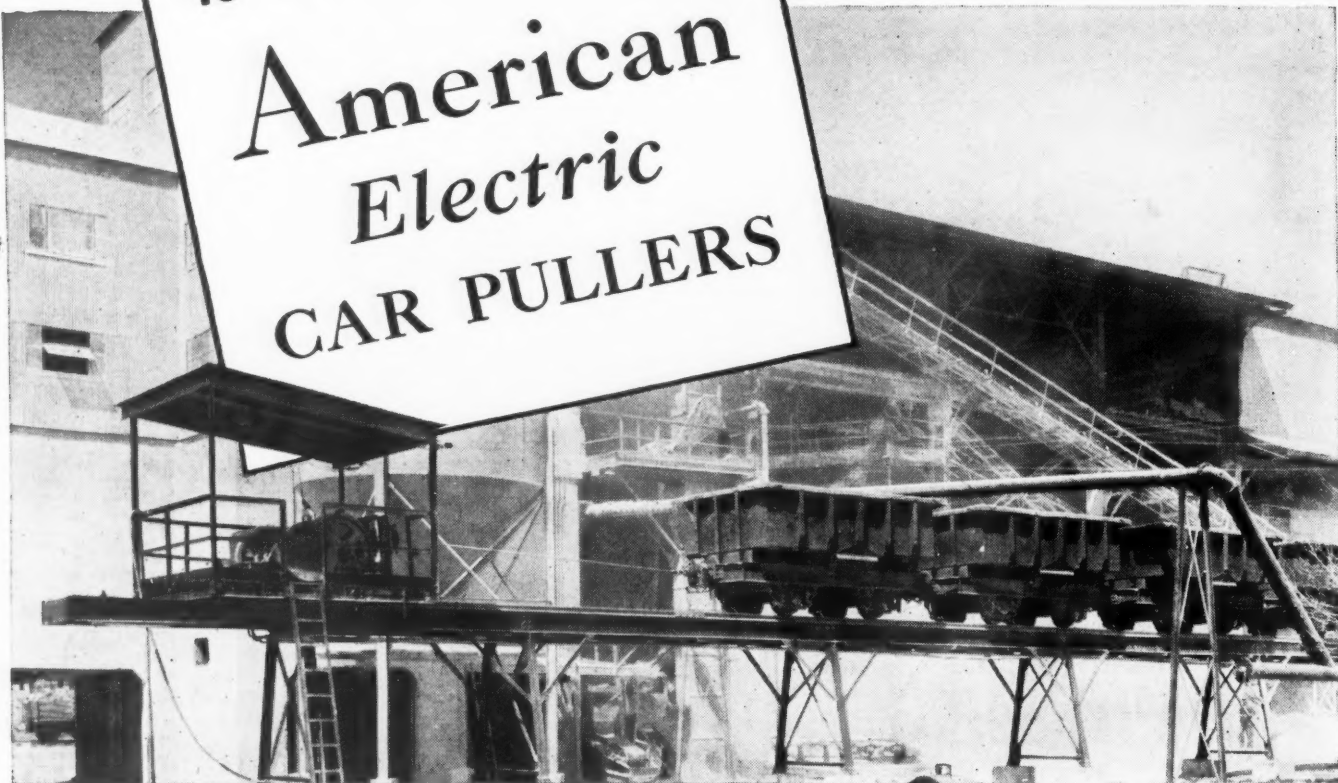
LIMA, OHIO

OTHER DIVISIONS: Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.

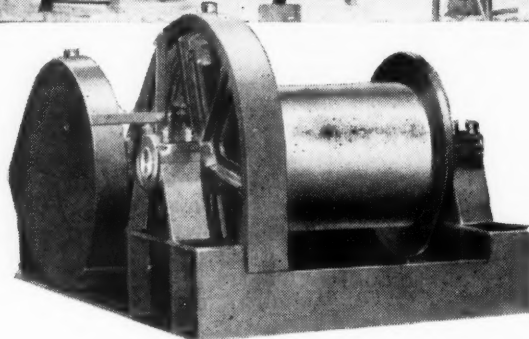


It's cheaper
to "ride the el" ... with

American Electric CAR PULLERS



6 SIZES ... 4,000 LB.
TO 30,000 LB. STARTING LINE PULL ...
HANDLE EVERY NEED IN MINING
AND QUARRYING



Take a guess at the average hourly "wages" of a locomotive ... and then compare that cost with the cost of operating an AMERICAN Car Puller!

The simplest kind of arithmetic will show you that "riding the el", with a short length of elevated track served by a good car puller, is the cheapest and best way of spotting cars for almost any mine or quarry. There's no waiting—no costly expense for standing by—and you have full control of all car movements.

AMERICAN Car Pullers lead the field. They are made by the company that designs and

manufactures one of the greatest lines of hoists in the world. The range of AMERICAN Car Puller types and sizes is wide, varied, versatile. Refinements of design and construction—such as machine cut gears, and welded steel beds—assure outstanding ruggedness, dependability, and long trouble-free life.

For complete, helpful information, see your AMERICAN distributor, or write us direct.

American Hoist and DERRICK COMPANY

St. Paul 1, Minnesota

Plant No. 2: SO. KEARNY, N.J. • Sales Offices: NEW YORK • PITTSBURGH • CHICAGO • NEW ORLEANS • SAN FRANCISCO

8103

Now!

**TRUE ROLLING...LONGER LIFE...
AT LOWER COST!**

in a steel-retainer-type bearing



The "Guide-Lip" Does it!

The New **Tru-Rol**

Here's the bearing that gained such quick popularity with Industry. It's the practical roller bearing for hundreds of applications. Tru-Rol is a precision bearing . . . and an economical bearing, too. Tested and proved design and construction make Tru-Rol a stand-out—a steel-retainer-type bearing that is efficient running-mate for Rollway's famous bronze-retainer bearing!

Inside the TRU-ROL



**Interchangeable
inner race**



**Steel retainer with
deep, broad pockets**



Heavy snap rings



Cylindrical rollers



Outer race

Only TRU-ROL has "Guide-Lips"

What they are—"Guide-Lips" are curved flanges, deep and broad in the retainer pockets.

What they do—"Guide-Lips" guide each roller in perfect alignment. They convey a thin film of lubrication to every roller . . . *and keep it there.*

The advantages they give you—First of all, greater economy. Second, true rolling with all it means in less wear, longer life, and lower maintenance expense.

**For better performance at lower
cost . . . specify Rollway's
NEW TRU-ROL.**

ROLLWAY BEARINGS

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Cleveland • Detroit • Chicago • Minneapolis • Birmingham • Houston • Los Angeles

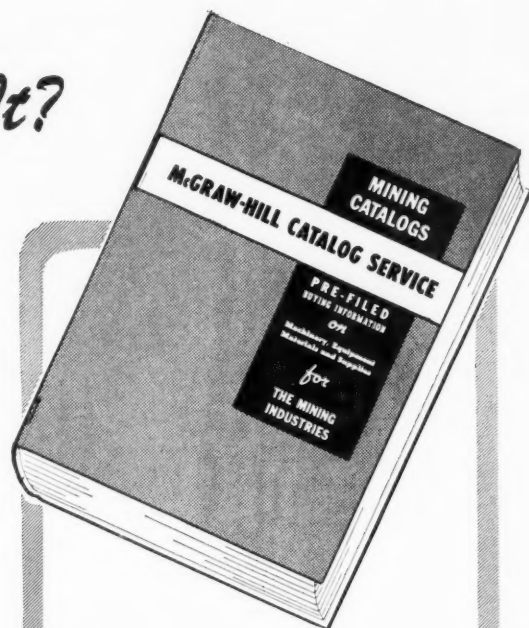
What Are The Specifications?

Who Makes It?

Where Can I Buy It?

... Here's the Mining Man's

ANSWER BOOK



MORE product data ...
and **FASTER** than from
any other source!

This thirty-third annual edition of
MINING CATALOGS contains:

- 1 Over 400 pages of descriptions, specifications and illustrations of machinery, equipment and supplies essential to the mining and preparation of coal in:
 1. Anthracite Mines (Deep and Strip) Collieries and Breaker Plants.
 2. Bituminous Mines (Deep and Strip) Collieries, Preparation Plants and Tipples.
- 2 A comprehensive Classified Product Directory designed to cover all known manufacturers recognized as regular sources of supply for all phases of the Mining Industry, is included as a bound-in section of each volume of the **MINING CATALOGS**.
- 3 Company names of manufacturers who have catalogs pre-filed in the **MINING CATALOGS** are listed in the directory in prominent bold-face type, with a reference to the pages on which their product information may be found.

The **MINING CATALOGS** offer a bonanza of buying information to all men responsible for selection and purchase of the machinery, equipment and supplies required for the operation and maintenance of bituminous and anthracite coal mines all over the world.

Here you can find—in an easy and instantly accessible form—up-to-the-minute descriptions, specifications and illustrations of the products of leading manufacturers which are specifically applicable to all phases of coal mining activity . . . Here you get the **FACTS**—edited and arranged for maximum convenience—covering the data you need to make fast, intelligent selections of the equipment and supplies commonly used in the following coal mining and processing operations:

Transport of Men and Materials • Loading and Conveying of Product • Crushing and Sorting • Mine Drainage • Lighting and Ventilation • Weighing and Storage • Portable Power Generation • Mining Equipment Maintenance • Engineering and Administrative Functions.

If YOU are not now receiving the **MINING CATALOGS**

McGraw-Hill CATALOG SERVICE
330 West 42nd St., New York 18, N.Y.

and are responsible for specifying or buying machinery, equipment or supplies for a mining operation, send a request on your company letterhead giving your full name and title. We will send you the current edition.

CHECK THE BENEFIT OF GREATEST IMPORTANCE TO YOUR OPERATION

- ✓ LOWER MAINTENANCE COSTS
- ✓ LONGER TIMBER LIFE
- ✓ GREATER MINE SAFETY

Secure the result by using . . .

OSMOSE treated timber where any degree of permanence is desired. Write for the full facts.



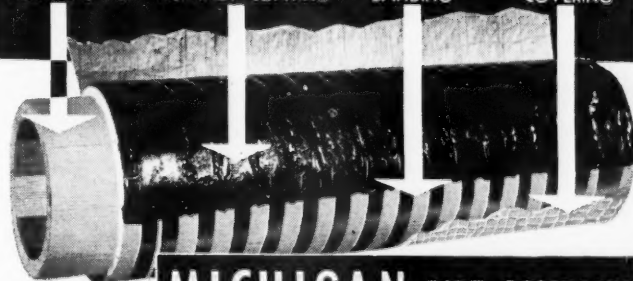
OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.
GENERAL OFFICE AND PLANT: BUFFALO 12, NEW YORK

"MICHIGAN" WOOD STAVE MINE PIPE For Handling Sulphuric Mine Water

Used by the largest mines in the United States, "Michigan" Wood Stave Mine Pipe has provided an economy unattainable thru the use of metal pipe.

"Michigan's" resistance to sulphurous mine water and culm--its long life, coupled with an ease of installation are factors which assure its supremacy in the mining field. A full range of standard sizes--2" to 48" will satisfy most mine needs. Write us stating your requirements:

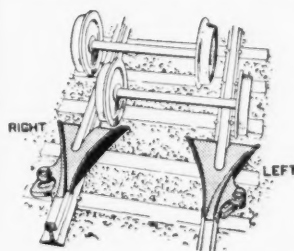
SELECT MICHIGAN PINE OR CLEAR DOUGLAS FIR THICK PROTECTIVE ASPHALT COATING HEAVY STEEL BANDING REINFORCED WATERPROOFED COVERING



MICHIGAN PIPE COMPANY
506 Phoenix Bldg., Bay City, Michigan

World's Quickest Way to Rerail Cars and Locomotives

**Nolan Rerailers Get 'Em
Back on the Tracks,
Saving Time, Labor, Money**



• This is the quick, efficient way to get derailed cars and locomotives back into productive service. No other rerailer has the patented, scientifically-designed features of the Nolan Rerailer.

Smashed hands, strained backs and often fatal accidents are eliminated when Nolan Rerailers are used. Safety Inspectors and Engineers highly recommend their use. Made of special high carbon steel for durability and long life.

How Nolan Rerailers Work. Nolan Rerailers are used in pairs, and will retract wheels from either or both sides of rail at same time. Each Rerailer straddles the rail, and the narrow end on top of the rail. The derailed wheel comes up the gradual slope, and is forced back on to the rail by the guiding grooves and ridges. Can be used anywhere on the track. The Nolan Rerailer is the only one that has a self-contained lock.

Size of Rerailer	For Use on Rails as Follows:	Locomotive or Car Capacity	Price Per Pair
No. 2	16 lbs. to 40 lbs.	10 tons	37.50
No. 3	30 lbs. to 60 lbs.	15 tons	42.50
No. 3 1/2	40 lbs. to 80 lbs.	20 tons	48.50
No. 4	50 lbs. to 75 lbs.	40 tons	59.00
No. 5	70 lbs. to 100 lbs.	100 tons	90.00
No. 6	100 lbs. to 152 lbs.	200 tons	182.50

F. O. B. Bowerston, Ohio

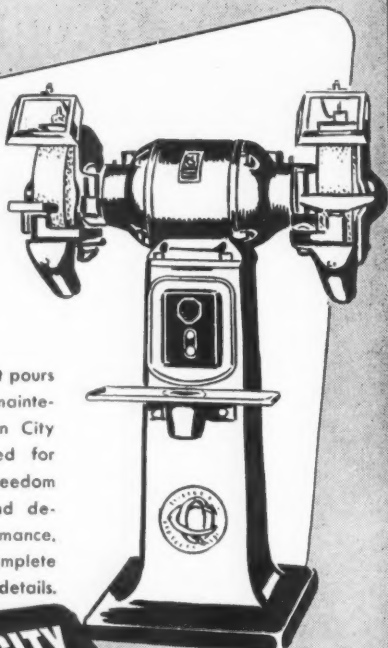
Send Order Now! Immediate Delivery. Complete Satisfaction Guaranteed! Free Descriptive Literature if Desired!

**THE NOLAN COMPANY, 106 Pennsylvania Street
Bowerston, Ohio**

cut
tool
costs...

**with rugged
QUEEN CITY
GRINDERS**

It takes a top-quality grinder to stand up under the heavy work that pours through a mine maintenance shop. Queen City Grinders are noted for their durability, freedom from downtime and dependable performance. Send for catalog complete with prices and details.



**QUEEN CITY
MACHINE TOOL CO.**

215 E. 2nd St.
Cincinnati 2, Ohio

AGENTS IN PRINCIPAL CITIES

It's YOUR Future—Make the most of it!



**Start now to earn
the bigger pay in
electrical repair**

WAS there ever such an opportunity to get started in electrical maintenance and repair—and at top-notch wages? Are you ready—with experience and ability—to cash in on it? Others are getting just the sort of background needed—quick! practical!—to handle the great variety of electrical maintenance and repair work TODAY — from this well-known electrical library. You can, too!

**THE LIBRARY OF ELECTRICAL
MAINTENANCE AND REPAIR**

5 vols., 1,826 pages, 1,724 illustrations

Gives you the "know-how" to tackle any wiring or motor job. Five books show you HOW—to install all types of motor and generator units—to inspect and repair motor starters and generators—to diagnose motor and generator troubles—to figure new winding for old cores—DC and AC windings—to test armature windings—test induction motors, etc., etc. One book is full of trouble-shooting charts that show quickly symptoms, causes, specific remedies, etc.

*Take the first step toward improving YOUR future—
Mail this coupon TODAY.*

No money down — special price — easy payments — FREE trial

McGraw-Hill Book Co., 330 W. 42nd St., N. Y. 18.

Send me Electrical Maintenance and Repair Library, 5 volumes for 10 days' examination. If I find the books satisfactory, I will send you \$2.50 in 10 days, and \$3.00 a month until \$17.50 has been paid. Otherwise I will return the books postpaid.

Name
Address
City and State
Company
Position C-9-48

*"We look
into the
Earth"*

CORE DRILLING
—anywhere!



**PENNSYLVANIA
Drilling Co.**

DRILLING CONTRACTORS

1205 Chartiers Ave. PITTSBURGH, PA. Walnut 5816

Since 1835...

**HEADQUARTERS for
Dependable, Cost-Cutting
PIT, MINE and QUARRY
Equipment**

McLANAHAN and STONE CORPORATION
HOLLIDAYSBURG, PENNA.

**Sand Drying
Stoves**

The SUTTON No. 0 IMPROVED SAND DRYER includes all the time-tested principles that have made SUTTON STANDARD Sand Dryers a favorite for over forty years, plus many improvements to give you even better results. Write for catalogs, prices.

- PERFORATED RING — Entirely new design.
- A FIRE BOWL added between the grate and perforated ring. New type FIRE GRATE.
- ASH PIT DOOR EXTENSION to protect clean sand from ashes.
- 3/16" STEEL PERFORATED SKIRTING with clean-out doors.
- ECONOMY FLAME SPREADER in dome.



SUTTON

Made by

INDIANA FOUNDRY CO.

950 Oak Street

Indiana, Pa.

Searchlight Can Help You!

HUNDREDS of miscellaneous business problems that confront you from time to time, can be quickly and easily solved through the use of the Searchlight Section of this or other McGraw-Hill publications.

The
SEARCHLIGHT
SECTION Classified
Advertising
of McGraw-Hill
Publications

Can help you by bringing business needs of "opportunities" to the attention of other men associated in executive management, sales and responsible technical, engineering and operating capacities with the industries served by:

Air Transport
American Machinist
Aviation Week
Bus Transportation
Chemical Engineering
Coal Age
Construction Methods
Electrical Construction
& Maintenance
Electrical Merchandising
Electrical World
Electronics
Engineering and Mining
Journal
Engineering News-
Record
E. & M. J. Markets
Factory Management
and Maintenance
Food Industries
Operating Engineer
Power
Product Engineering
Textile World
Welding Engineer

The Searchlight Section is the classified advertising appearing in each of these papers. You can use it at small cost, to announce all kinds of business wants of interest to other men in the fields served by these publications. It is the regular meeting place of the man with a miscellaneous business need and the men who can fill that need.

When you want additional employees, want to buy or sell used or surplus equipment, want additional products to manufacture, seek additional capital, or have other miscellaneous business wants—advertise them in the Searchlight Section for quick, profitable results!

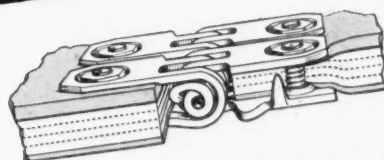
Classified Advertising Division

McGraw-Hill Publishing Co., Inc.
330 West 42nd Street New York 18, N. Y.



HINGED FLEXCO BELT FASTENER

... for conveyor belts



Hinged Flexco No. 500 is for use on Underground Extension Conveyor Belts and any other conveyor belts measuring $\frac{3}{8}$ " to $\frac{1}{2}$ " thick.

It is new. It is strong. It has a tightly wound spiral spring for a hinge pin that is flexible—can be easily inserted—easily removed—used again and again.

Inspect it at
BOOTH 801
Metal Mining Convention
Exhibit
September 20-21-22-23
San Francisco, Calif.

OR
Write for bulletin HF-500 and
ask your Supply House for
a demonstration.

FLEXIBLE STEEL LACING COMPANY

4638 W. Lexington Street, Chicago 44, Illinois

With proper guidance from top management, the nation's workers can powerfully attack inflation at its source.

One way, of course, is by increasing production. But production of most goods already has been pushed to maximum! The other approach is to reduce the volume of dollars that can be used to bid up prices on scarce goods.

There's no more effective tool for this job than the Payroll Savings Plan for the regular purchase of U. S. Security Bonds. Via this plan, 5.5 million wage earners are investing over 8% of their pay—over 100 million dollars per month—in Bonds.

What Is the Status of the Plan in Your Company?

In companies where top management backs the Plan, 35% to 50% of the employees participate, and the average total Bond-holding is \$1200 per family. If these figures are above those for your employees, it is apparent that the Plan needs reinvigoration by your personal sponsorship.

Benefits Accrue to the Nation and to Your Company

Every Bond dollar that is built up in the Treasury is used to retire a dollar of the national debt that is potentially inflationary. Every Bond held means fewer dollars to go to market to bid up prices on scarce goods. In addition, dollars invested in Bonds are building future purchasing power. All these factors contribute to the security of the national economy—including your business.

Bonds build security for individuals, because every \$3 invested pay \$4 at maturity.

Moreover, in 19,000 companies operating the Payroll Savings Plan, employees have proved to be more contented. Worker production has increased, absenteeism has decreased—even accidents have been fewer!

Management's Role Is Vital

Even with all its benefits, the Payroll Savings Plan requires sponsorship by top management to keep employees *aware* of the benefits. That's why the Treasury Department has prepared a kit of materials especially for you to distribute among specific key personnel. Be sure to get and use your kit—for the security of your company and your country!

For any help you want, call on your Treasury Department's State Director, Savings Bonds Division.

HOW you and
your employees
can reduce
this inflationary gap

PURCHASABLE
GOODS

NATIONAL
INCOME

The Treasury Department acknowledges with appreciation the publication of this message by

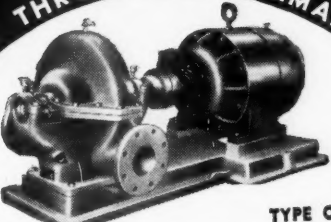
COAL AGE



This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council.

Another Great PUMP "by Aurora"

WINS RESPECT THROUGH PERFORMANCE

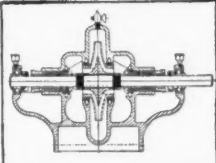


DOUBLE SUCTION

TYPE OD


AURORA CENTRIFUGALS
for Every Pumping Job
HORIZONTAL SPLIT CASE
Single & Two Stage
SIDE SUCTION
VERTICAL NON CLOG SUMP
MIXED FLOW SPECIAL DESIGN
Write for **CONDENSED CATALOG "M"**
or
Consult SWEETS

AURORA HORIZONTALLY SPLIT CASE DOUBLE SUCTION SINGLE STAGE CENTRIFUGAL PUMPS



Available in capacities to 4,000 G.P.M. and heads to 300 ft., these accessible, compact, and lasting Type OD Pumps are widely used for general water supply, for municipalities, industrial plants, office buildings, institutions. Also for handling condenser circulating water, wash water, liquids in paper mills and distilleries, chemical solutions, oil in oil fields and refineries, irrigation, etc.

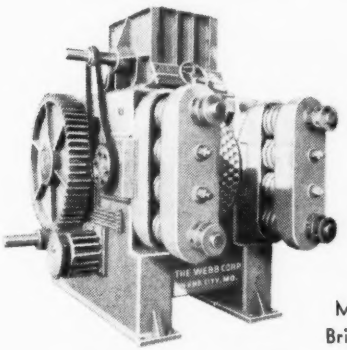
APCO TURBINE-TYPE PUMPS
Here's the Pump for "1001" duties. SIMPLE — only one moving part, the Impeller. Unsurpassed for low capacity, high head duties. Slight change in capacity against drastic head variations.



DISTRIBUTORS IN PRINCIPAL CITIES

AURORA PUMP COMPANY

92 Loucks Street, AURORA, ILLINOIS



Model 30-22
Briquette Press

WEBB
HEAVY DUTY
BRIQUETTE PRESS
For Coal and Other Materials
WRITE FOR DATA
THE WEBB CORP.
Manufacturers
WEBB CITY, MISSOURI
COMPLETE BRIQUETTING PLANTS DESIGNED AND CONSTRUCTED

The greatest help a coal mining man can have—

IF YOU want to make sure of getting your certificate of competency—sure of winning a bigger job with bigger pay, get Beard's great books today and put them to work for you.

In these three books you have a practical, always-on-the-job guide that will help you solve the problems you face every day, show you what to do, tell you why it should be done.

Beard's
Mine Examination
Questions and Answers

3 Volumes—\$8.25, Payable in Three Easy Installments

THESE books explain what a man must know in order to become a mine inspector, a mine foreman, assistant foreman, fireboss, hoisting engineer, safety engineer, shot-firer, etc.

They give you complete and authoritative information about air and gases, explosives, safety requirements and methods, mechanics, engines, hoisting, drainage, pumping, ventilation, timbering, instruments, and every other detail that the practical mining man must know.

Can you answer these questions—

What is meant by splitting the air current and what are the advantages derived from such methods?

Can a miner live in air in which the oxygen content is reduced to 17 per cent?

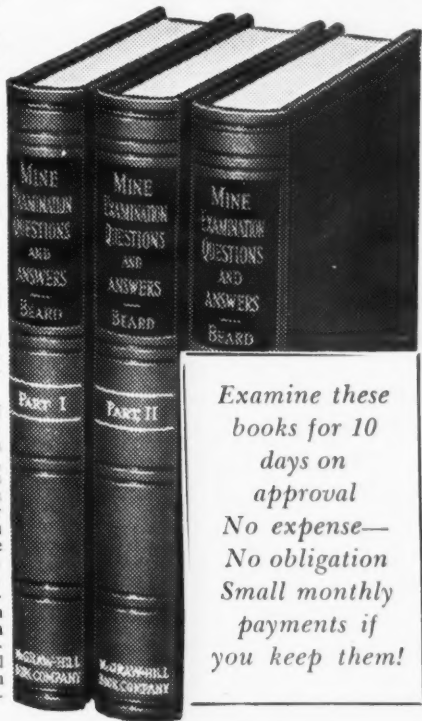
Name five duties imposed on mine foremen by law?

In what time can an engine of 40 effective hp. pump 4,000 cu. ft. of water from a shaft 360 feet deep?

What are the advantages and disadvantages of a gasoline pump, an air pump and an electrical pump?

What is the estimated tonnage per acre, per foot of thickness, for bituminous coal?

These are but a few of the more than 2,000 questions given in Beard's books together with full, correct answers. Hundreds of men have used this method to prepare for higher, better jobs. You can, too, if you have the Beard books and plan to use them systematically. They are the best investment that a mining man can make—not only as an aid for passing examinations but as practical reference volumes on everyday mining operation problems.



Examine these books for 10 days on approval
No expense—
No obligation
Small monthly payments if you keep them!

McGRAW-HILL ON-APPROVAL COUPON

McGraw-Hill Book Co., Inc., 330 West 42nd St., New York

Send me, charges prepaid, **Beard's Mine Examination Questions and Answers**, 3 volumes, for 10 days' examination. If satisfactory I will pay \$8.25 at the rate of \$2.25 in ten days and \$3.00 per month. If not wanted I will return the three volumes postpaid.

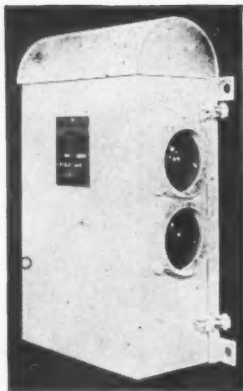
Name

Address

City and State.....

Company

PositionC-9-48



NUSSCO AUTOMATIC MINE SIGNALS

For Main Haulage • Prevent Collisions
Save Trip Time

A two wire cable connects two or more signals together into one block. Only one signal can show proceed on the entrance of a trip, all other signals show stop.

NACHOD & UNITED STATES SIGNAL CO.
INCORPORATED
4771 Louisville Ave., Louisville, Ky.

- Low in Cost.
- Easy to Install.
- Write for Catalog.

CESCO ELECTRICALLY OPERATED TRACK SWITCH

Thrown by Motorman

Operates Switch Safely • Saves Time and Money

This modern track switch is thrown swiftly and safely by motormen as they sit in their cabs. It saves time and money, and is fool-proof and dependable!

Over 40 years experience manufacturing
ELECTRIC TRACK SWITCHES

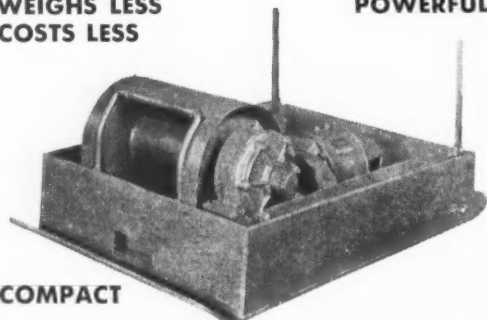
Write for Catalog
CHEATHAM ELECTRIC SWITCHING DEVICE CO.
INCORPORATED
4780 Crittenden Drive, Louisville, Ky.

BUILT TO MEET A DEMAND!

LIGHT DUTY JUNIOR CAR SPOTTING HOIST

WEIGHS LESS
COSTS LESS

POWERFUL



COMPACT

4000 lb. rope pull—35' a minute

Just what the small operator needs! No need to use or buy big Room Hoist. Large drum capacity. Reducer (rated 5 hp.) mounted directly on drum shaft. Overall dimensions 60" long, 36 1/4" wide, 13" high. Priced right. Send for complete information today.

Flood City Brass & Electric Co.

Messenger & Elder Sts., Johnstown, Pa.

Branch Office: 4 Virginia St. W., Charleston, W. Va.

PERFORATED METAL COAL MINING SCREENS
Manufactured exactly to your specifications. Any size or style screen, in thickness of steel wanted with any size perforation desired. We can promptly duplicate your present screens at lowest prices.

CHICAGO PERFORATING CO.
2443 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

HOFFMAN BROS. DRILLING CO.

Diamond Core Drilling Contractors
Punxsutawney, Pa. • Tel. 382

WE HAVE SPECIALIZED IN TESTING BITUMINOUS COAL LANDS FOR MORE THAN 40 YEARS

GASOLINE • STEAM • ELECTRIC DRILLS • WE PRE-GROUT SHAFT LOCATIONS • HORIZONTAL DRILL HOLES FROM 3" TO 16" FOR DEWATERING MINES • OUR OPERATORS ARE HIGHLY SKILLED



WE HAVE ALWAYS GUARANTEED SATISFACTORY COAL CORES... We solicit your inquiries

COMPLETE BELT CONVEYORS

BELTING • IDLERS • HEAVY DUTY PAN FEEDERS

Immediate Delivery

WRITE FOR LITERATURE

Reduced Prices

FRANK A. KREMSEY AND SONS, INC.

3435-45 NORTH 5th STREET, PHILADELPHIA 40, PENNA.

At Fifth Street Where The World Goes By On The Pennsylvania Railroad

REgent 9-7272
" 9-7524

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RELEASED

UNDISPLAYED RATE:

Not available for equipment advertising 90c a line. Minimum 4 lines. To figure advance payment count 5 average words as a line.

(See 1 on Box Numbers.)

POSITIONS WANTED (full or part-time individual salaried employment only), 1/2 the above rates.

PROPOSALS, 90 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE

The advertising rate is \$7.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches—to a page. C.A.

NEW ADVERTISEMENTS received by 10 A.M. September 22nd will appear in the October issue subject to limitations of space available

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

WANTED: MINING Engineer, preferably engineering graduate, capable of making and extending mine maps, designing simple mine structures, and doing any other work usually necessary in a mining engineering office. Must be A1 draftsman, as fully half time will be spent in this work. Must be able to take charge of field party either underground or in field when not in mine office. Attractive offer for right man. Send complete details of experience and training in reply. No drunks need apply. CWD, 413 Clover St., Harlan, Kentucky.

POSITIONS WANTED

MINING ENGINEER, broad experience, organizer and planner. Wants position as chief or division engineer. Illinois professional registration. Employed, married, sober, competent. PW 6154, Coal Age.

GRADUATE ENGINEER with 25 years coal mining experience, particularly interested in investigation, analysis, and valuation. Wants responsible job with expanding organization. Interview desired. PW 6155, Coal Age.

EXPERIENCED MALE Stenographer. Also trained in accounting. At present private secretary to President of large firm. Veteran. Married. PW 6091, Coal Age.

MINE FOR SALE

The Hoosier Mine at
Mt. Olive, Illinois

The top improvement and tippie were destroyed by fire in 1941. This is an 8 foot vein of coal that has had industrial and consumer acceptance for years. Fully developed below with excellent operating condition. 3000 acres of coal rights served by Wabash and Illinois Central on Route 66 Highway to St. Louis. Write

JOHN HITTEMEIR

MT. OLIVE, ILLINOIS

Modern all steel seven bin tippie with shaker screen and shaker gates suitable for rail or truck loading.

Two Bruce-McBeth, 300 H P each, natural gas engines direct connected to 150 KW Burke D C generators.

Cooper-Bessemer 250 H P direct connected to 150 KW Westinghouse D C generator, all engines with compressors, starting tanks and switch boards.

Approved type D C Rock Duster.

Ingersoll-Rand track mounted compressor, jack hammer, hose and bits.

55 Edison Model H Electric cap lamps with charger, rack and spare parts.

HARRISON & QUINETTE COAL CO.

R.D. 2, Glen Shaw, Pa.

Mine Phone Dorseyville 80-J, Evenings
Pittsburgh, Sterling 4730

COAL LANDS

Suitable for strip mining. Complete details upon request.

G. B. LORRAINE

Law Building Richmond 19, Va.

W. VA. COAL LANDS

Large or small tracts. On R.R. and water. Exceptional values.

BO 5318—COAL AGE

330 West 42nd Street, New York 18, N. Y.

FOR SALE

Various types and kinds of coal mining equipment; also 6 coal mines, complete; 3 of these mines are in operation; have equipment of all kinds for small and large mines—write for information.

Lawrence Boutwell, General Manager

B & W COAL COMPANY

Phone Shawneetown 2723 Junction, Illinois

FOR SALE COALMASTER

Approximately 65,000 No. 42 Coal-master Bits.

Consolidation Coal Co. (W. Va.)
Fairmont, West Virginia

For Rent

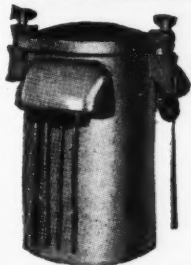
1—New 1 1/4 yd. Diesel Shovel.
1—New HD 19 Allis-Chalmers Tractor Bulldozer. Available Sept. 15, 1948.

F. R.-6051, COAL AGE

330 W. 42nd St., New York 18, N. Y.

WANTED

—TRANSFORMERS—



TRANSFORMERS WANTED

in operating condition or burnt out. Mail us list giving complete nameplate data and stating condition.

We Rewind, Repair and Redesign All Makes and Sizes
ALL TRANSFORMERS GUARANTEED FOR ONE YEAR

THE ELECTRIC SERVICE CO., INC.

"AMERICA'S USED TRANSFORMER CLEARING HOUSE"

Station M

Since 1912

CINCINNATI 27, OHIO

Your inquiry

will have

Special value . . .

If you mention this magazine, when writing advertisers. Naturally, the publisher will appreciate it . . . but, more important, it will identify you as one of the men the advertiser wants to reach with this message . . . and help to make possible enlarged future service to you as a reader.

WANTED

3/4 to 5 yard Shovels
2 to 10 yard Draglines

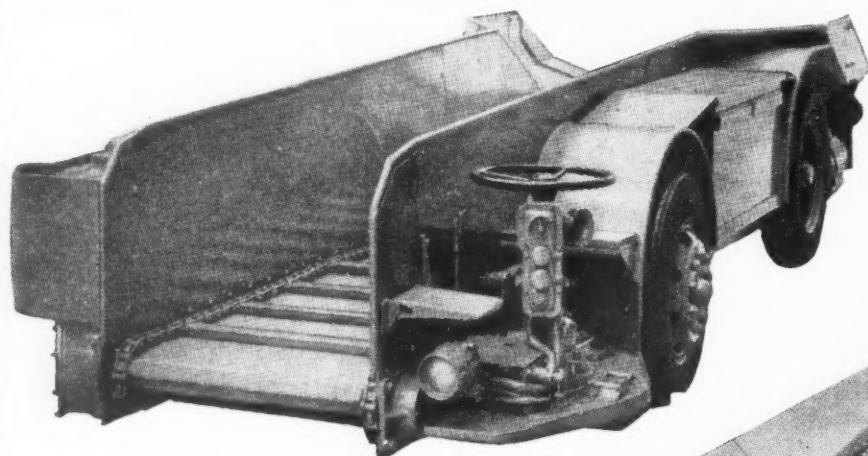
Tractors and Dozers

Frank Swabb Equipment Co., Inc.

Hazleton National Bank Building
Hazleton, Pa.
Telephones 4911 and 4910J

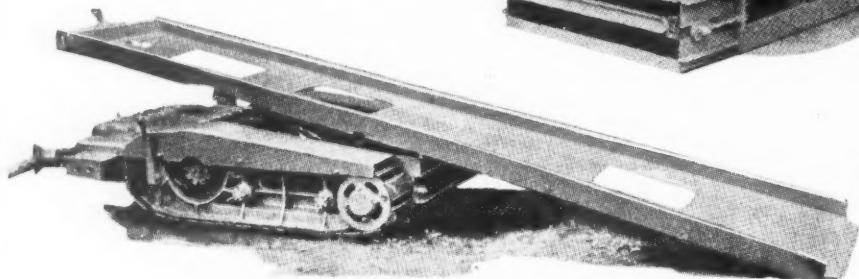
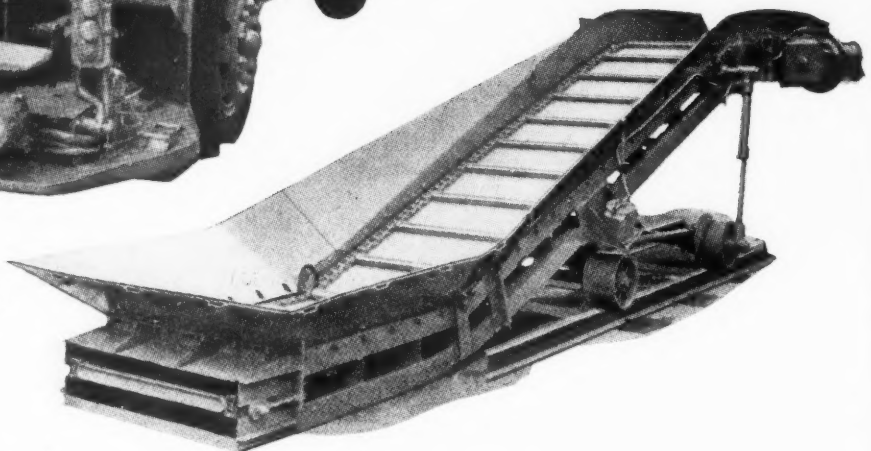
COMPLETE LIQUIDATION IMMEDIATE DELIVERY

... New and nearly new
coal mining machinery
and equipment

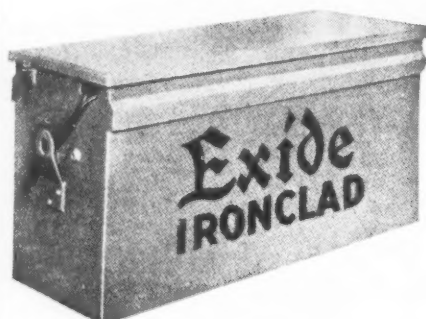


LEFT:
JOY 42-D
SHUTTLE CAR

RIGHT:
JOY
SHUTTLE CAR
WITH ELEVATING
CONVEYOR

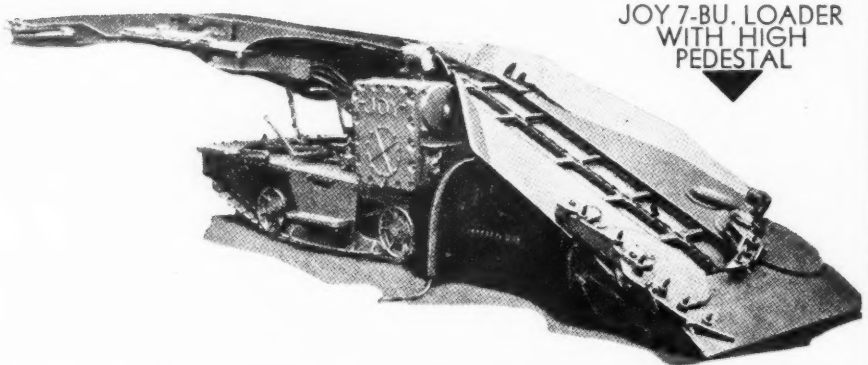


LEFT:
JOY "T-1"
MINING MACHINE
TRUCK



EXIDE AND GOULD
IRONCLAD BATTERIES

BELOW:
JOY 7-BU. LOADER
WITH HIGH
PEDESTAL



THE COLUMBINE MINE EQUIPMENT CO., INC.

FLAT IRON BUILDING, 1669 BROADWAY

DENVER 2, COLORADO

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

SEE PAGE 205 FOR APPROXIMATE SUMMARY OF HARD-TO-GET OFFERINGS



THE COLUMBINE MINE EQUIPMENT CO., INC.

... New and nearly new
coal mining machinery
and equipment

1669 BROADWAY, DENVER 2, COLORADO

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

Complete Liquidation . . . Immediate Delivery

Here are some of the HARD-TO-GET OFFERINGS

(While They Last)

1—10 ton Jeffrey locomotive 36" ga. (trolley type), 250 v. D.C.

3 ton, 4 ton, 6 ton, 8 ton, 10 ton, 15 ton, and 20 ton G. E., Westinghouse, Jeffrey and Goodman locomotives.

COAL MINING MACHINES—29 L-E "Arcwall" Jeffrey mining machines mounted on Joy electrically driven caterpillar trucks.

Goodman Shortwall No. 112 mining machines.

Goodman 36" gauge TRUCKS, Type "M."

MINING MACHINE TRUCKS—Joy "T-I."

MOTOR GENERATOR SETS—I set 225 H.P. connected to Ridgeway 150 K.W. generators, with panelboards, A.C. and D.C. meters and transformers complete. I set 300 H.P. connected to Ridgeway generators, 200 K.W., complete with panelboards, A.C. and D.C. meters and transformers. And others.

BATTERY CHARGING UNITS—Joy, Westinghouse, Hobart Bros. Co., Electric Products Co.

MOTORS—A.C. and D.C., all types, 1 H.P. to 300 H.P., starting compensators and switches.

TRANSFORMERS—General Electric, Westinghouse, 7½ KVA, 37½ KVA and 150 KVA.

BOX CAR LOADERS—Ottumwa-Manerre.

PUMPS—Geared and centrifugal—motor and belt driven—Gould, Demming, and Myers.

FANS—American Blower, Sturdevant.

TIPPLE—3 track tipple consisting picking screens, grizzlies, car retarders, end dump, belt conveyors, elevator bucket conveyors, box car loaders complete.

VIBRATOR SCREENS—Ty-Rock Tyler F-600 2 surface 5'x10' Screen, full floating.

SHAKER SCREENS—"Marcus" shaker screens.

CONVEYORS—Flight conveyors, elevator conveyors.

COAL CRUSHERS.

RAILS—150 tons 60 lb., 150 tons 65 lb.

SPIKES, bolts, tie plates, frogs, switches, switch throws.

COPPER trolley wire—2/0, figure 8 and 4.0 round.

TROLLEY HARDWARE—Hangers, clamps, frogs, switches, roof hangers.

TRANSMISSION WIRE—Single conductor, 2 conductor, 3 conductor—Neoprene, glass, rubber insulated 2/0 to 500,000 CM. New.

JOY 7-BU. LOADERS—Caterpillar mounted with high pedestal.

SHUTTLE CARS—Joy 42D storage battery.

ELEVATOR CONVEYORS—Joy.

AIR COMPRESSORS.

MACHINE SHOP—Complete.

ELECTRIC SHOP—Complete.

CARDOX PLANT—Complete.

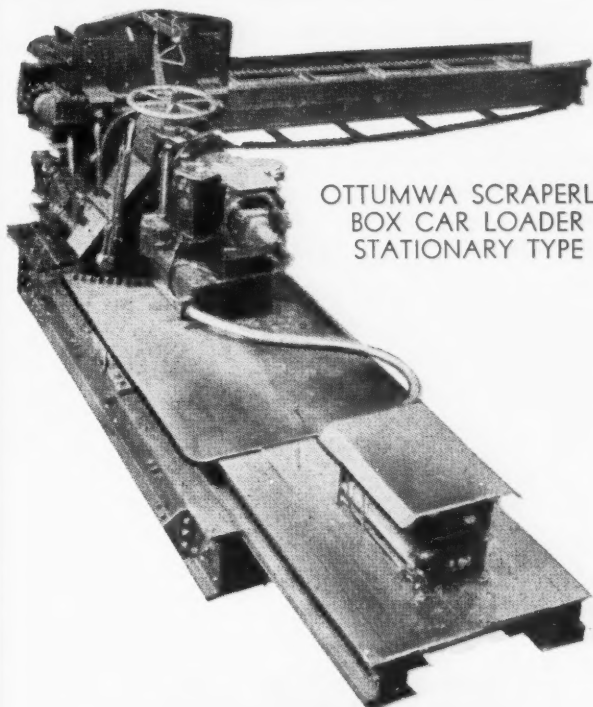
BATTERIES—Exide and Gould Ironclad, 24 cells.

\$150,000.00 WORTH of new parts, bearings, gears, bolts, nuts and screws for Joy, Jeffrey, Goodman, Ottumwa, Manerre, General Electric, Westinghouse, Demming, and other popular manufacturers' equipment.

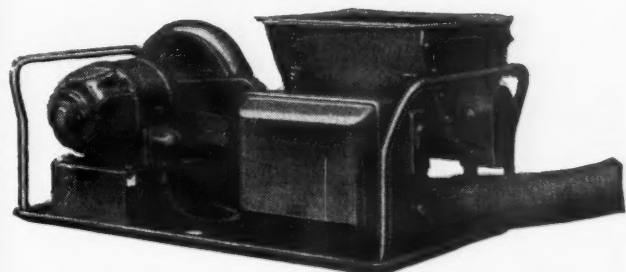
ROTARY CAR DUMPER for 36" gauge Cars With Automatic Control.

HOISTS—I Double Drum Conical Hoist—Denver Engineering Works—300 HP., Silent Chain Drive, Complete With All Panelboards, Transformers and Controllers and Numerous Others.

ALSO THOUSANDS OF ITEMS TOO NUMEROUS TO MENTION



OTTUMWA SCRAPERLINE
BOX CAR LOADER
STATIONARY TYPE



MINE SAFETY APPLIANCE CO.
ROCK DUSTER



GOODMAN TYPE 112
SHORTWALL COAL CUTTER

WRITE FOR OUR COMPLETE LIST OF MACHINERY AND EQUIPMENT

SHOVELS - DRAGLINES - DRILLS - TRACTORS

621-S Page 135' boom, 6 yard 2 engine diesel dragline. Very good condition.

Model 120-B Bucyrus-Erie Electric Shovel. 4 yard dipper, 60 cycle electric. Machine has been recently rewired, and truck and crawlers have been rebuilt. Located near Hazleton, Pa.

Model 120-B Bucyrus-Erie Electric Dragline. 110' boom, 4 yard bucket! 3 phase, 60 cycles, 2300 volts. Machine is in excellent condition. Located in Virginia.

111-M Marion 3 1/2 yard Standard Shovel equipped with two G.M.C. diesel engines. Machine less than 1 year old.

1201 Lima Dragline. 80' boom, 3 yard bucket; Waukesha-Hesselman diesel engine. Fine condition. Near Hazleton, Pa.

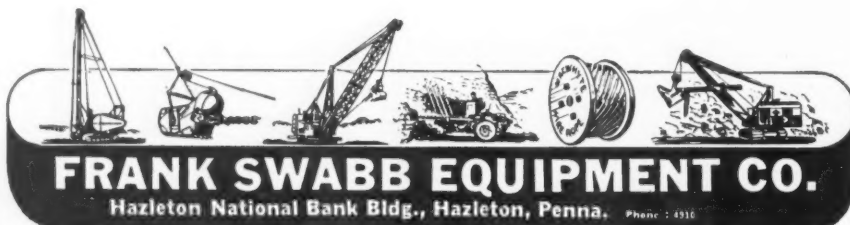
Model 595 Link-Belt Diesel Dragline. 85' boom, 2 1/2 yard bucket; 2 years old. Located in West Virginia.

955 P&H 2 1/2 yard Shovel. Equipped with Buda diesel engine. Near Hazleton.

1007 Osgood Dragline. 80' boom, 2 1/2 yd. bucket, D17000 Caterpillar diesel engine, Kohler light plant. Less than 1 year old.

Model 82 Lorain with 2 yard bucket, 75' boom, Waukesha-Hesselman engine. Has long, wide cats. Near Hazleton.

We carry in stock Page Automatic Dragline Buckets. We may have the size you need for immediate delivery.



Telephone 4910

K-480 Link-Belt 75' boom, 2 yard dragline. Waukesha-Hesselman engine.

Bucyrus-Erie 37-B 1 1/2 yd. Shovel. D13000 Caterpillar engine. Excellent condition. Located in Hazleton.

Model 362 Marion 1 1/2 yd. Shovel. Equipped with D13000 Caterpillar engine. Late 1946 model. Located near Hazleton.

Model 44 Loomis Clipper Blast Hole Drills. Full Crawlers. Tools for 6" holes.

42-T Bucyrus-Erie Blast Hole Drill with Caterpillar diesel engine; tools for 9" holes.

Parmanco Vertical Auger Drill. Mounted on Dodge power wagon. 2 speed power feed; 60' 6" augers.

D-4 Caterpillar Tractor with bulldozer blade. Unused.

D-7 and D-8 Caterpillar Tractors and Bulldozers. Rebuilt.

TD-9 International Caterpillar Tractor with Hydraulic angledozer blade.

1201 Lima Standard Shovel Front — 32' boom, 22' stick, 3 yard Amsco dipper.



M-G SETS—AC to DC
500 KW G.E. DC 250 V., synch. motor 440 V.
150 KW Cr. Wl. DC 250 V., synch. motor 440 V.
100 KW Whse. rotary converter, 250 V. DC output.
80 KW Star DC 250 V., synch. motor 440 V.

D.C. MOTORS—230/250 V.
150 HP Cr. Wh. b.b. TFC 890 RPM.
100 HP Whse. SK 181 450/900 RPM.
80 HP G.E. CDM 1,800 RPM, b.b. drip (2).
75 HP Allis-Ch. E. 500 RPM, auto starter.
60 HP Allis-Ch. b.b. 520/690 RPM, New.
50 HP G.E. CD 123 850 RPM.
40 HP Whse. SK110L 1700 RPM.
40 HP Whse. SK133 850 RPM.
30 HP Whse. SK 160 350/1050 RPM.
25 HP Whse. SK 1100 RPM.
15 HP Whse. SK 850 RPM (5).

Complete Stock A.C. Motors—New and Rebuilt Up to 500 H.P.—Sg. Cage, Slip Ring, Synch.
SPECIAL—600 H.P. G.E. slipring motor
360 RPM, 3/60/440 V.
500 HP G.E. slipring motor, 3 brg. 3/60/2200 V., 450 RPM.
Gear Head Motors Speed Reducers Pumps—Blowers
WRITE — WIRE — PHONE

ARTHUR WAGNER CO.
1433 W. Randolph St. Chicago 7
ELECTRIC MOTORS · GENERATORS

IMMEDIATE SHIPMENT AT REDUCED PRICES

Conveyor for mines and
tipples priced from.....\$ 665.00
Picking table, with motor
and 48" belt..... 1,100.00
Stoker Coal crusher..... 474.00
Large coal crusher..... 1,074.00
15-ton truck scale..... 450.00
20-ton truck scale..... 510.00
33-ton truck scale, 34'
platform 1,650.00
5-ton tipple scale..... 312.00
Vibrating screens, 2' to 5'
wide, many lengths, 1 to 5
decks. All with screen cloth
or plates to customers'
specifications. Priced from 648.00

BONDED SCALE & MACHINE COMPANY
2190 S. Third St., Columbus 7, Ohio
Phone Garfield 2186 University 2832 Evenings

HIGH GRADE TOOLS

18"x8' American Screw Cut. Engine Lathe.
#500 UK Hanchett Face Grinder.
#104-2 Rivett Internal Grinder.
72x72x20 Niles Belmont Pond Planer.
42x42x20 Cincinnati Hypo Planer.
6" Pratt & Whitney Vert. Shaper.
#2B Simmons Micro Speed Turret Lathe.
24", 36" & 42" Bullard Vertical Turret Lathe.
3" Bar Fostick Horizontal Boring Mill.
2 1/2" Giddings & Lewis Horizontal Boring Mill.
2 1/3" Giddings & Lewis Horizontal Boring Mill.
20"x12" Boye & Emmes Lathe.
24"x16" American Geared Head Lathe.
2' to 6' Plain Radial Drills.
16" and 24" G & E Shapers.
150-ton Wheel Press.
New No. 3 Davis Keyseating Machine.
Also various other machine tools.
Send us your inquiries
Cincinnati Machinery Company, Inc.
217 E. Second St. Cincinnati 2, Ohio

WESTINGHOUSE

TYPE SK—MOTORS
WIRE INQUIRIES COLLECT

**MOTORS, GENERATORS,
TRANSFORMERS**
1 — 1500 H.P.
Bought and Sold
New and Rebuilt
ELECTRIC EQUIPMENT CO.
Rochester 1, N.Y.

AIR COMPRESSORS

2—175 CFM Inger. Rand 2 cyl. vert. 150 P.S.I.
Type XIV dir. con. to G.E. 50 HP DC motor.
230 V. 400 RPM. Mounted on factory cast iron
base. Complete with inter-cooler, unloader and
access.
PHILADELPHIA TRANSFORMER CO.
Box 566 Dalton, Pa.

Large stock 2 conductor Miller Plugs
25% off list
Mechanical Rubber Goods—Pumps—
Motors. Conveyor Engineers
UNION SUPPLY COMPANY
1401 Wazee DENVER, COLORADO
Phone ALpine 2091

IRON and STEEL PIPE
New and Used
Large stocks, all sizes
attractive prices
L. B. FOSTER COMPANY
P. O. Box 1647 Pittsburgh 30, Pa.

PIPE — MACHINERY — GAS ENGINES AIR COMPRESSORS — DIESELS — PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY

WAYNE, WOOD COUNTY, OHIO

Near Toledo

DEPENDABLE MINING EQUIPMENT

AIR COMPRESSORS

- 1—8 $\frac{3}{8}$ x 4 $\frac{3}{4}$ x 5 Chicago-Pneumatic, 277 Cu. ft. displacement. V-belted to a D-4400 Caterpillar Diesel Engine—Semi-portable.

BUCKET ELEVATORS

- 2—Bucket Elevators, 5" x 4" and 5" x 10" buckets (Belt) 20' Centers with Motor.
- 1—Bucket Elevator, 6" x 10" Buckets (Belt) 45' Centers with Motor.

SLUSHER HOISTS

- 1—Ingersoll-Rand, 3-drum, with direct connected 50 H.P. AC Motor, and 2—1 $\frac{1}{2}$ yd. Crescent Scrapers, unit used about 60 days.

WAGON DRILLS

- 1—Ingersoll Rand, with drifter, all on pneumatic tires, used about 6 months.
- 1—Sullivan #LW-6, with drifter, on steel wheels.

PUMPS

- Peerless and Layne and Bowler Deep Well Pumps, from 4" to 8".
- Ingersoll Rand High Head Motor Mounted Pumps, from 1 H.P. to 25 H.P.
- Several sizes Triplex, Piston and Centrifugal Pumps.

GENERATORS—DIESEL

- 4—D-13000 Caterpillar Diesel Generators, 75 KW, 440 Volts, AC.

BELT CONVEYORS

- 2—24" 15 to 75' Long, with Ding's Pulley.
- 1—24" 30' Long, with 5 H.P. Gearhead Motor.
- 1—28" 30' Long, with 2 H.P. Gearhead Motor.
- 1—30" 70' Long, with driving mechanism.
- 1—36" 50' Long, with driving mechanism.

MAGNETIC PULLEYS

- 1—24" Dia. x 26" Face Stainless Steel Ding's Magnetic Pulley, complete with charger.

STEEL TANKS

- 1—8'6" x 29'8" Tank (Steel Army Bolted Type) Open Top, Cap. 44,000 gals.
- 1—6' x 18' Steel Horizontal Closed Tank.

COAL CUTTERS

- 4—Sullivan CE-7 AC Short Wall, complete with Standard and Tip-turn Trucks, most machines with Power Cable.

TROLLEY LOCOMOTIVES

- 2—7 $\frac{1}{2}$ -Ton Goodmans, 36" Gauge, 250 Volt DC.

COAL WASHING EQUIPMENT

- 2—Rheolaveur Launderers, complete with steel supporting frame.
- 1—60" Dia. Dividing Table, direct connected to 2 H.P. D.C. Motor.
- 1—Galigher Aut. Sampler with adjustable stroke and direct connected to a 1/6 H.P. Motor.
- 1—12' x 10' Steel Hopper Bin.
- 1—7' x 12' Dorr Thickener Tank, complete with mechanism.

COAL CRUSHERS

- 1—26" American Ring Type.
- 1—24 x 20 Jeffrey Swing-Hammer Mill.

MOTORS

- New and Used AC Motors, 1 $\frac{1}{2}$ H.P. to 40 H.P.
- Used D.C. Motors, 10 H.P. to 75 H.P.

RAILS

- 50 Tons—65# Relaying Rail.
- 15 Tons—40# Relaying Rail.

MINE FANS

- 1—8-H60 Aerodyne Exhausting Fan, with Air Locks, Hood, etc., 75 H.P. Motor—Purchased new in 1942.

LARRY CARS

- 4—Connellsville Larry Cars, Trolley Operated, 6-Ton Capacity.

HOISTS

- 1—No. 22 Vulcan, with Man Cage, 30' Steel Head-frame and 40 H.P. Single Speed Elevator Type Motor, equipped with Solenoid Brake. (Hoist purchased new in 1942.)
- 1—Single Drum Gasoline Hoist, direct connected to 25 $\frac{1}{8}$ x 4 $\frac{1}{4}$ Wisc. Gas Engine.
- 1—15 H.P. Single Drum Hoist, direct geared to motor with controller and grids.

PIT CARS

- 160 Card Iron Works R.B. Pit Cars, 36" Ga.
- 1 Card Iron Works Rock Car, 90 Cu. Ft. Capacity.

TRACTORS

- 2—Diesel Caterpillar 50 Tractors, with 10' Angle Dozers.

MISCELLANEOUS

- Flight Conveyors, 8" to 30" wide to 165' Centers.
- 1—3,200' Aerial Tramway.
- 1—25 KW Crocker-Wheeler, 250 Volt D.C. Generator.
- 3—37 $\frac{1}{2}$ KVA Transformer, 440-110/220 Volts.
- Electric single and double gongs Mine cages.

Write for our Bulletin No. 9 and Utah List

FLORENCE
MACHINERY AND SUPPLY COMPANY
SUITE 904, EQUITABLE BUILDING DENVER 2, COLORADO

C. J. Parrish, Mgr.
PHONE: AL. 2803
Yards: Denver and Florence, Colorado

CRANES-MOTORS and ELECTRICAL EQUIPMENT

ENGINEERED AND REBUILT BY SPECIALISTS IN OUR MODERN PLANT

SQUIRREL CAGE MOTORS 3-PHASE, 60-CYCLE					
Qu.	HP.	Make	Type	Volts	RPM.
1	40	Al. Ch.	AR	440	860
1	40	Master	PA-445	440	1200
3	50	Whse.	CS	440	690
1	50	F.M.	H-16-A	440	900
1	50	Al. Ch.	AR-2201D	440	1155
1	50	Ideal	AT-445	440	1750
1	60	Whse.	CS-607	440	880
1	75	G.E.	NF-542	440	1200
1	75	Whse.	CS	440	1750
1	75	Al. Ch.	AR	2300	1765
5	100	F.M.	HS-201C	440	880
2	100	G.E.	KT-556	2200	865
1	100	Whse.	CS-760	2200	1170
1	100	G.E.	K-514	2200	1175
1	100	Al. Ch.	AR	2200	1160
1	100	G.E.	I-K	440	1800
2	125	Al. Ch.	AR	440	435
2	125	C.W.	126Q	440	430
1	125	Whse.	CS-761	440	1750
2	125	Al. Ch.	AR	2200	1750
1	150	G.E.	I-K	440	690
1	150	El. Mch.	R.B.	220	1200
1	250	Whse.	CS	2200	1160

SLIP RING MOTORS — CONSTANT DUTY 3-PHASE, 60-CYCLE					
Qu.	HP.	Make	Type	Volts	RPM.
1	25	G.E.	MT-526	440	840
1	25	G.E.	MT-532	2200	850
2	25	Whse.	CW-1810	220	1750
1	30	Whse.	CW	440	1160
1	40	Al. Ch.	ARY	2200	435
3	40	G.E.	MT-346	550	560
3	40	G.E.	I-M	600	1170
1	50	Al. Ch.	ARY	2200	490

2	50	G.E.	MT-536	2200	1150
1	75	G.E.	MT-548	440	1200
1	125	Al. Ch.	ARY	440	900
1	150	G.E.	I-M	440	495
1	150	G.E.	I-M	440	1180
1	200	G.E.	I-M	2200	1750
1	200	G.E.	I-M	2200	580
1	200	G.E.	I-M	440	580
1	250	Whse.	CW-1106	2200	580
1	300	Al. Ch.	ARY	2200	505
1	300	G.E.	I-M	2200	1200
1	400	G.E.	I-M	2300	875
1*	600	G.E.	MT-412Y	2200	720
1**	750	G.E.	MT-414Y	2200	709
1**	1200	Whse.	CW	2200	590

*40-Cycle.

**Mill Type 2-Pedestal Bearing on Cast Iron Base. Complete with Reversing primary and Magnetic Secondary Control.

SYNCHRONOUS MOTORS 3-PHASE, 60-CYCLE					
Qu.	HP.	Make	P.F.	Volts	R.P.M.
2	50	G.E.	.8	2200	600
1	60	G.E.	.8	440	1200
2	100	G.E.	.8	440	600
1	100	Ideal	.8	220	900
1	150	G.E.	1.0	2300	900
2	200	Al. Ch.	1.0	2300/440	360
3	1250	G.E.	1.0	4160/2300	900

MOTOR GENERATOR SETS					
Qu.	KW	Make	RPM.	Volts D.C.	Volts A.C.
1	5 1/2	G.E.	1800	250	220/440
1	9	G.E.	1800	250	220/440

7	25	Whse.	1200	120/240	220/440
3	50	Whse.	1200	120/240	440/2300
2	35	G.E.	1800	125	220/440
1	50	Lo. Al.	1200	120/240	440/2200
1	75	Whse.	1200	125	220/440
1	75	Al. Ch.	900	250	2200
1	100	G.E.	1200	250	440/2300
1	100	C.W.	1200	250	440/2300
3	150	C.W.	1200	300	440/2200
1	300	Whse.	1200	125/250	2300
1	400	Whse.	720	550/275	2300
2	1000	G.E.	514	600	4150/2300

G.E. Rotary Converter, 2025/2565 KW, 225/285-V.D.G., 450-RPM., complete with A.C. and D.C. panels and control, 2760 K.V.A. transformer, OISC, 6900-V., 3-Ph., 60-Cy.

TRANSFORMERS (OIL COOLED)					
Qu.	K.V.A.	Make	Voltage	Phase	Cy.
2	10	Whse.	2400-480/240	1	60
2	15	Kinn.	480/240	1	60
1	25	Al. Ch.	2300-460/230	1	60
1	30	G.E.	2200/1100-608	1	60
3*	37.5	Whse.	460/230-230/115	1	60
3	50	Al. Ch.	2200-220	1	60
2	50	Wagnr.	13200/11880-575/287	1	60
14 (New)	100	G.E.	4330/4160-125/250	1	60
6	100	G.E.	2400-125/250	1	60
3	130	G.E.	19000/9500-2200/550	1	60
3 (New)	150	Wagnr.	8800/440-2300	1	60
3	165/247	G.E.	38500/22000/11000-430/215	1	60
3	667	G.E.	2300/4000Y-460	1	60

*Air cooled.

T. B. MAC CABE COMPANY.

4314 CLARISSA STREET

PHILADELPHIA, PENNA.

AVAILABLE IN STOCK—EXCELLENT QUALITY RELAYING RAILS AND ANGLE BARS

AS FOLLOWS:

500 TONS 60 LB ASCE RAIL
200 TONS 75 LB ASCE RAIL
500 TONS 85 LB ASCE RAIL

For Prices and More Detailed Information Contact

COMMERCIAL METALS CO.

Dallas, Texas

EVERYTHING FOR THE TRACK FROM SWITCH TO BUMPER

300 TONS
40# NEW RAIL
DOUBLE DUTY FORTIES
20#-25#-30#-35# and 40#
SWITCHES & COMPLETE TURNOUTS

MORRISON
RAILWAY SUPPLY CORP.

RAND BLDG., BUFFALO 3, N. Y.
EMPIRE BLDG., BIRMINGHAM 3, ALA.
CONTINENTAL OIL BLDG., DENVER 2, COLO.

RAILS — CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK

480 Lexington Ave. 810 Park Bldg., Fifth Ave.
New York, N. Y. Pittsburgh 22, Pa.
Reno, Nevada Carnegie, Pa.

RAILS

NEW AND
RELAYING

From 5 Warehouses
Track Accessories
• Prompt Shipments
• Fabricating Facilities
• Trackage Specialists

L. B. FOSTER CO.
NEW YORK CHICAGO HOUSTON
PITTSBURGH SAN FRANCISCO

ADDRESS THE FOSTER OFFICE NEAREST YOU!

RELAYING RAIL

TRACK ACCESSORIES

MIDWEST STEEL CORP.

Gen. Off.: CHARLESTON 21, W. VA.

Warehouses
CHARLESTON, VA.
KNOXVILLE, TENN. • PORTSMOUTH, VA.

TURBO GENERATOR: Curtis Steam Turbine driven Generator Unit, 600 KW, 5 stage, 200 lbs. steam pressure, 3600 RPM, with condenser, General Electric Generator, 750 KVA, 2300 volt, 3 phase, 60 cycle, with exciter, piping, valves, etc.

COAL PULVERIZER: Kennedy Van Saun Air Swept Pulverizer Mill, 4' x 7', capacity 3600 lbs. of fuel per hour, 40 H.P., A.C. motor, 7 1/2 H.P. pulling fan, 1/2 H.P. coal feed motor, complete with all instruments, etc.

PUMP: Worthington 40 H.P. steam driven Centrifugal Pump, 300 lbs. steam pressure, 3550 RPM, with steam regulator. Complete, in new condition.

BOILER: Ames 80 H.P. Package Unit, catalog A-80, 125 lbs. steam pressure, oil fired equipment, used only eight months.

A. J. O'NEILL

Lansdowne Theatre Building
LANSDOWNE, PA.

Phila. Phones: Madison 8300 — 8301

AIR COMPRESSORS:

12—Belted, 360, 676, 870, 1,000, 1,300 ft.
12—Diesel 105, 315, 520, 676 & 1,000 ft.
6—Electric 1,300, 1,500, 2,200, 5,000 ft.

CARS & LOCOMOTIVES:

65-Ton G. E. Diesel Elec. Locomotive.
100—50 ton cap. Gondolas.
35—50 ton cap. Flat Cars.
8—100-ton, 45-ton, 30-ton Diesel Locomotives.
50—20 yd. cap. Air Dump Cars.
6—10, 16, 20 & 30 ton Gas Locomotives.
150—8,000 & 10,000 gal. cap. Tank Cars.
20—12 yd. Std. ga. Steel Dump Cars.

ELECTRIC LOCOMOTIVES:

15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:

12—100, 150, 180 & 480 K.W.

MINE LOADERS:

17—GD9, Elmcot 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

STEEL TANKS:

6—50,000 and 100,000 gal. Tanks on tower.
30—8,000, 10,000 and 20,000 gallon capacity.
9—80,000 & 20,000 bbl. cap.

SHOVELS—DRAGLINES:

7—1 yd., 1 1/2 and 2 yd. Gas & Diesels.
16 yd. Elec. 160 ft. Boom Dragline.

WANT BUY

Air Compressors and Locomotives.

R. C. STANHOPE, INC.

60 E. 42nd Street New York 17, N. Y.



REBUILT EQUIPMENT—READY TO SHIP

AXIAL FLOW VENTILATING FANS

- 5—50" dia. 72½" long. 2 sets of propellers. 8 blades to each. Dim: of blade 14"x9½" curved m'd by International. Size 114, driven by 100 HP., 1750 rpm. 220/440 v. 3 ph. 60 cy. A.C. Motor.
- 6—16000 CFM Buffalo Forge Co., 3" stat. pres. 1800/1200 rpm. con. 15/4.5 HP. 1710/1150 rpm., 3 ph. 60 cy. G.E. A.C. Motor 220/440 v. totally encl.
- 2—12000 CFM 3" stat. pres. Sturtevant with dir. con. 10/3 HP., 1775/1180 rpm., 220/440 v. West. CS. TEFC Motor.
- 1—7500 cfm Clarage with dir. con. 7½ hp., 1750 rpm., 3.3 ph at 1160 rpm., 220/440 v. 3 ph. 60 cy.
- 2—6000 cfm. Sturtevant 1.65" stat. pres. dir. con. 2.7/8 hp 220/3/60 A.C. Motor.
- 31—6000 cfm. Sturtevant Bulletin 512389, 3" stat. pres. 7 blade, dir. con. 5/1.5 HP., 1765/1175 rpm., 220/440 v. 3 ph 60 cy. West. TEFC Motors.
- 2—5000 cfm Sturtevant 1.8 stat. pres. 4.2/1.25 HP., 1750/1150 rpm., 3 ph. 60 cy., 220/440 v. ball-bearing motors.
- 2—4000 cfm 3" stat. pres. Sturtevant dir. con. 2 speed. TE Westinghouse 220/440 v. Motors.
- 1—4000 cfm 3" stat. pres. Sturtevant Axial Flow vent fan dir. con. 4/1.2 HP., 1750/1150 rpm., 220/440 v., 3 ph. 60 cy. Tot. Enc. West. Motor.

HOISTS

- 1—Welen—2 drum 8600± per drum, each drum is 6' cir. with 430 ft. of ¾" cable per drum can be increased to take 600'. 120 FPM per drum, driven by 25 HP., 1750 rpm., 230 V. D.C. motor.
- 1—Single Drum Triple Reduction Hoist, 28" dia. drum, 20" face, 1" flange, 27 grooves for ½" rope—300' of rope with 10 HP., Westinghouse A.C. Slip Ring Motor 70/80 FPM.
- A.C. GENERATORS—3 ph., 60 cy.**
- 1—450 kva. Elec. Mach., 120 rpm, 4000/2200/220/440 v.
- 2—new 125 kva. Delco, 1200 rpm., 220/440 v.
- 2—115 kva. Elec. Mach., 720 rpm., 220/440 v.
- 1—100 kw. Elec. Mach., 720 rpm., 220/440 v.
- 1—100 kw. West., 900 rpm., 2200/220/440 v.
- 1—100 kw. West., 600 rpm., 220/440 v.
- 4—25 kw. O'Nan, 1800 rpm., 220/440 v.

SPECIAL BARGAINS

- 11—100 kw., 250/275 v. Delco Generator dir. con. to 150 HP., GBD-8, 5½"x7, 8 cyl. Superior Diesel elec. starting, with muffler, power panel and accessories. Almost new—only used as spares.

230 V. D.C. MAGNETIC STARTERS AND CONTROLLERS

- 456—New, 1 HP. Cutler Hammer across the line.
- 111—New, 1 HP. Cutler Hammer across the line.
- 30—New, 2 HP. Cutler Hammer across the line.
- 55—New, 5 HP. Cutler Hammer drip proof 2 step current limit OL and LV.
- 58—New 7½ HP. Cutler Hammer.
- 60—10 HP. Cutler Hammer Magnetic.
- 12—10/15 HP. 230 V. Westinghouse Magnetic Drip Proof Controllers, 2 steps acceleration thermal overload relay with stop, start and reset buttons.
- 9—New, 10/15 HP., 230 v. G.E.
- 10—New, 20/35 HP., 220 v. Ward Leonard Magnetic.
- 10—New, 40 HP., 230 v. G.E. Magnetic.

PUMPS — with AC or DC Motors			
Qua.	GPM	Head	Make
2	1300	277'	Worthington
2	1200	300	Worthington
2	1100	323	Worthington
2 New	1000	346	Worthington
1	1000	370	Worthington
2	900	365	Worthington
8	800	378	Worthington
2	800	150	Worthington
2	700	188	Worthington
2	600	182	Worthington
1	600	220	Dayton Dowd
2	600	393	Worthington
2	400	196	Worthington
1	332	202	Worthington

A.C. MOTORS—3 ph., 60 cy.			
No.	HP.	Make	Type
1 new	500	E.&M.	syn
1	200	West.	CS
1	150	West.	syn
1	150	West.	syn
2	150	Delco	syn
4	150	Louis AL.	syn
1	125	E.&M.	syn
1	125	West.	CS
2	125	Reliance	CS
1	125	West.	CS
1	100	Reliance	495
1	100	West.	CS
3	100	Elec. Mch.	syn
1	100	Alis-Ch.	syn
1	100	Master	TEFC
1	100	West.	CS
2	85	Reliance	450
1	75	Stanley	600
1	75	Elec. Mch.	syn
1	60	G.E.	KT
1	50	Fynn Wehl.	900
1	50	American	860
2	50	G.E.	K-405

- D.C. GENERATORS—250 V., D.C.**
- 3—250 kw. Westinghouse, 1200 rpm.
- 2—200 kw. Reliance, 500 rpm.
- 8—100 kw. Reliance, 500 rpm.
- 1—100 kw. West., 720 rpm.
- 7—100 kw. Delco, 1200 rpm.

MOTOR GENERATOR SETS

250 V. D.C. Motors 220/440 or 2200 v. 3 ph. 60 cy.			
No.	KW	Make	Speed
1	150	West.	1800
1	100	West.	1800
2	100	Delco	1150
1	75	West.	720
1	50	Cr. Wh.	900
2	50	West.	490
1	40	G.E.	720
3	40	West.	900
1	40	G.E.	1750
1	35	G.E.	950
1	30	G.E.	680
1	30	West.	850
1	25	West.	1150
1	20	G.E.	1150
2	20	Delco	1200
2	15	West.	1800
1	7½	West.	1150
1	5	West.	1150

ENGINE GENERATOR SETS

- 10—NEW 1 kw 14.25 v. D.C. and 2 kw. 28.5 v. D.C. Homelite portable gas eng. Gen. sets. Can furnish lamps and batteries. Suitable for farms and camps.
- 3—5 kva. 120/240 v. 1 ph. 60 cy. Witte Diesel.
- 1—10 kw., 115 v. D.C. 1200 rpm., Hercules DIESEL.
- 30—NEW 25 kva. West. 120/208 v. 1 and 3 ph. 60 cy. LeRoi GAS.
- 1—35 kva. 220/440 v. 3 ph. 60 cy. 257 rpm., Ridgeway STEAM.
- 12—100 kw., 240/120 v. Delco 1200 rpm., dir. driven by 150 HP. Superior GBD-8 5½"x7" 8 cyl. DIESEL.
- 1—125 kva. G.E. 220/440 v. 3 ph. 60 cy., dir. con. Skinner UNIFLOW Engine.

HOISTS or WINCHES

- 200—1½-ton Hand Cranked ratio 27.1 thru an enclosed double reduction gear unit with 4 planetary gears mounted on steel plate complete with 48" ½" cable, ratchet type brake, push button release.

CAR PULLERS

- 100—Brand New with ¾" cable, 1½ and 2 ton A.C. or D.C. Motors.

SPECIAL BARGAIN AIR COMPRESSORS

- 7—240 CFM Westinghouse type 3 VS-23 3 cyl. vert., 150 lbs. pres. dir. con. to 50 HP., 220/440 or 2200 v. 3 ph. 60 cy. West. Slip Ring Motors, auto. Control. Can furnish D.C. Motors or Oil or Gasoline Engines if desired.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH (6), PA.

Montrose — 5800

FOR SALE

CRUSHERS

- 1—McNally Pittsburgh 24 x 24 double roll crusher.
- 1—McNally Pittsburgh 24 x 48 multiplex single roll crusher.
- 1—Jeffrey 24 x 20 flex-tooth crusher.
- 1—Link Belt 36 x 60 double roll crusher, equipped with gear drive.
- 1—American Pulverizer crusher, No. 1627. Type AC, machine number AC3B, crushes from 20" down to 1½".
- 1—McNally Pittsburgh 30 x 54 single roll crusher.

MOTOR GENERATOR SETS

- 1—100 KW GE motor generator set, 250 volt. DC, complete with switchboard.
- 1—50 KW motor generator set, AC end, 75 HP Westinghouse squirrel cage motor, type CS, 3 phase, 60 cycle, 220 volts, 1140 RPM, 1504169, DC end, 50 HP Crockier Wheeler, type CCM, 230 volts, 275 amps, 254053, complete with compensator for AC end.
- 1—100 KW Diesel Generator set with switchboard.
- 1—50 KW motor generator set, consisting of: 75 HP. Crockier Wheeler DC motor, compound wound, No. 254053, 230 volts, 273 amps, type CCM, size 50H, connected to 75 HP. Westinghouse AC motor, 220 volts, 1170 RPM, 3 phase, 60 cycle, 166 amps, type CS, No. 1504169, complete with compensator for AC end, but no switchboard for DC end.
- 1—50 KW motor generator set, AC end 2.200 volts, DC end 250 volts, complete with compensator. Perfect condition.

TIPPLES

- 1—Steel tipple complete with shaker and concrete silos. Capacity 1,000 tons per day.

PUMPS

All sizes and types of pumps.

MINING MACHINES

- 2—Sullivan type CH8, AC longwall mining machines, 3 phase, 60 cycle, 220 volt, 30" cutter bars, complete with 300' each of 3 conductor mining machine cable.

- 2—Goodman, Universal mining machines, type 112-G3, 36" gauge.
- 1—Jeffrey 35BB, AC shortwall mining machine, 6' cutter bar, complete with tip turn truck, cable and reel.

- 1—Goodman Universal mining machine, 112AA, 42" gauge, 250 volts, DC, 8' cutter bar.
- 1—Sullivan 7B AC shortwall mining machine, 3 phase, 60 cycle, 220 volts.
- 1—Sullivan CLE 5 Longwall mining machine, 220 v. AC.

HOISTS

- 1—Ottumwa Iron Works single rigid cylindro-conical drum hoist, serial number 4080, complete with remote control and hydraulic brakes, constructed for following hoisting conditions: Weight of cage, 4,000 lbs., weight of car, 1,600 lbs., weight of coal average 2,500 lbs., total cage travel 277 ft. (HVD) size of rope 1½", trips per hour 78, rest period 15 sec. Balanced hoisting without slack rope, end lift. Post brake 72" diameter, 8" face. Direct connected to Western Electric 150 HP motor, 3 phase, 60 cycle, 440 volts, slip ring speed full load 760 RPM, complete with automatic switchboard.

- 1—Ottumwa Iron Works single friction drum hoist, serial number 3846 driven by double reduction gears. Built for 7,000 pounds of rope pull with rope speed of 250 ft. per minute. Equipped with a drum 48" diameter, 26" face not grooved, 60" diameter band brake, 48" diameter Lane type band friction clutch. Drum shaft 5 7/16" diameter, intermediate shaft is 4 15/16" diameter. High speed pinion is mounted on the motor shaft. Complete with 100 HP GE motor 2628725, type 1-12-100A-600, form M, 3 phase, 60 cycle, 220 volts, 255 amps, speed no load 600, speed full load 570, equipped with controller and resistance.

- 1—Ottumwa Iron Works Hoist, serial number 3561. Drum is 48" diameter, 36" face grooved for 1" rope. Equipped with a post brake 54" diameter, hand operated. Has single reduction cut spur gears, 19 teeth and 198 teeth 1½" pitch, 10" face. Drum shaft 7" diameter. Drum shaft bearings 7" x 14" pinion shaft bearings 4½" x 15" of the ring oiling type. Built for the following hoisting conditions: weight of car 900 lbs., weight of coal 2,500 lbs., weight of cage 3,000 lbs., cage travel 250 feet, rope speed 700 ft. per minute. Built for balanced hoisting single rigid drum type, driven by single reduction gears, pinions being connected to the drum by a flexible coupling. Direct connected to 100 HP Westinghouse motor, type CW, 220 volts, 3 phase, 60 cycle, 360.8 amps to 580 RPM, 2394853 equipped with controller and resistance.

LOCOMOTIVES

- 1—6-ton Jeffrey locomotive, 42" gauge.
- 1—5-ton Jeffrey locomotive, 42" gauge.
- 1—4-ton Whitcomb battery locomotive, 36" gauge.

TRANSFORMERS

- 2—75 KVA GE transformers, type H, form G3, 60 cycles, voltage 11,500—2300/1000, serial 1013840, and 104229.
- 2—250 KVA Adams Ragnall transformers, serials 46299, 42688, 60 cycle, 13200/2400, taps 5 and 10 Pol. Add., single phase, rebuilt by Albertson Electric Company, Milwaukee, ON 23387, 6.42.

We are distributors for John A. Roebling's Sons Company wire rope and fittings.

GAVENDA BROTHERS, Inc.
CANTON, ILLINOIS

250-VOLT BALL-BEARING LOCOMOTIVES

- 4—8-ton Goodman, Type 32-A-1-4-T.
- 4—6-ton Westinghouse, Type 905-L.
- 5—6-ton General Electric, Type HM-801.
- 3—8-ton General Electric, Type HM-819.
- 2—8-ton General Electric, Type HM-707.
- 4—8-ton General Electric, Type HM-839.

The above Locomotives are from 36" to 48" gauge. All are equipped with CY-21 motor-driven gathering reels and 500' of practically new cable. All are rebuilt. Can make immediate shipment.

600 END-DUMP 3½-TON STEEL MINE CARS

- Height overall—46".
- Length of body—9".
- Overall length—10'2".
- 18" Timken roller bearing wheels
- Wheel base—36".
- Width—64".
- Axles—3".
- Steel bodies—3/16".
- Drawbar—1" x 4".
- Oak bottoms—3/4".
- 3—Link couplings.
- 3—Binders.
- Spring draw head one end.
- Track gauge—42".

AC CUTTING MACHINES

- 5—Goodman Universal 112-G3, 3 phase, 60 cycle, 220/440 volt, on self-propelled trucks.

LATE TYPE GATHERING REELS

- 5—Practically new General Electric motor-driven Gathering Reels, Type MVR-42-F5, Reel Motor Type 301-E2 with 500' of practically new cable.
- 3—CY-21 motor-driven Reels with 500' of cable.

250 VOLT COAL CUTTING MACHINES

- 1—Practically new Jeffrey 29-U Universal Track Cutter, Serial No. 25993.
- 3—New Jeffrey 29-L Low Vein Type Track Cutters, 30" tramming height, 8" cutter bar, 9" adjustment of cutter bar, 4¾" adjustment of adjusting screw; will cut 6" below rail.
- 6—Jeffrey 35-BB Machines, just taken out of service.

LOADING MACHINES

- 1—L-500-B Jeffrey Loading Machine, Serial No. 23255, 250 volt DC.
- 3—8-BU Joy Loading Machines on cats. 42" gauge, 220/440 volt AC.
- 6—7-BU Joy Loading Machines on cats. 42" gauge, 220/440 volt AC.

ELECTRIC HOIST

- 1—1,650 HP Shaft or Skip Hoist, Fly Wheel Set, 7" small diameter by 11" large diameter, cylindro-conical drum, 300' 1½" rope capacity, practically new unit. Complete specifications on request.

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

COAL MINE EQUIPMENT SALES COMPANY

306-307 BEASLEY BUILDING L.D. PHONE 34 TERRE HAUTE, INDIANA



Frank J. Wolfe

MOTOR GENERATORS

- 500 KW G.E. SYN. 275 V. 2300/4000 V. 3 PH. 60 CY. 900 RPM. MANUAL SWITCHGEAR.
- 500 KW G.E. SYN. 575 V. 2300/4000 V. 3 PH. 60 CY. 900 RPM. MANUAL SWITCHGEAR.
- 400 KW G.E. SYN. 275 V. 2300/4000 V. 3 PH. 60 CY. 900 RPM. MANUAL SWITCHGEAR.
- 400 KW WEST. SYN. 575 V. 2300/4000 V. 3 PH. 60 CY. 720 RPM. MANUAL SWITCHGEAR.

SYNCH. CONVERTER

- 300 KW G.E. 575 V. 6 PH. 60 CY. 1200 RPM. Pedestal Type. 2300/4000 V. TRANSFORMERS and SWITCHGEAR.

LOCOMOTIVES

- 30-T Jeffrey 250 V.MH-77 Mts. 48"-36" Ga.
- 20-T Jeffrey 250 V.MH-77 Mts. 44"-36" Ga.
- 15-T Jeffrey 250 V.MH-77 Mts. 48"-36" Ga.
- 13-T Jeffrey 250 V.MH-110Mts. 42"-32" Ga.
- 10-T Jeffrey 250 V.MH-110Mts. 42"-32" Ga.
- 10-T West. 250 V. 907-C Mts. 36"-44" Ga.
- 8-T West. 250 V. 906-C Mts. 42"-48" Ga.
- 6-E West. 250 V. 903-B Mts. 22"-32" Ga.
- 6-T G.E. 250 V. HM-701 Mts. 22"-32" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK CO.

501 Grant Building Pittsburgh, Pa.

FOR SALE

- 4 Goodman Style G20B77 permissible Shaker Conveyors, latest type with 300 ft. size 3 troughs, manual Type HAD duckbill and 20 HP Westinghouse AC motor, 3 phase, 60 cycle, 220 volt, 1160 RPM.
- 4 Sullivan Class 7B Cutting Machines, with 50 HP AC motor, 3 phase, 60 cycle, 220 volt, and Bowditch cutter bar and chain, 9 ft. long, 5" kerf.
- 4 Chicago Pneumatic Style 574-700 post mounted coal drills, 220 volt, 60 cycle, 3 phase, AC.

All of above to include usual accessories and guaranteed to be in A-1 condition. New in 1943.

KAISER COMPANY, INC.
Iron & Steel Division
Sunnyside, Utah

Electrical Equipment

Converters, Motor Generator Sets, A.C. and D.C. Motors, Control Equipment and Transformers.
We build equipment to fit your requirements. Over 25 years engineering background.

MOTORS

- 150 HP, 900 RPM, Elec. Mach., 220/3/60, Syn.
- 80 HP, 1,200 RPM, Cr. Wh. 220/440/3/60, Inc.
- 75 HP, 900 RPM, Elec. Mach., 220/3/60, Syn.
- 75 HP, 1,800 RPM, U. S., 220/440/3/60, Ind.
- 65 HP, 1,200 RPM, G.E., 220/440/3/60, Ind.
- 30 HP, 1,200 RPM, G.E., 220/3/60, Slip Ring
- 5, 7½, 10 and 15 HP, new and used, TEFC and open.

- (5) 5 HP, 2,200 RPM, Reliance, Ex. Pr., 230 V, DC.
- Several Whse. type SK, 230 V, DC.

GENERATORS

- 100 KW, 1,400 RPM, Whse. SK, 250 V, DC.
- 100 KW, 2,000 RPM, Whse. SK, 250 V, DC.

C. B. LOCKE CO.
P.O. BOX 3227
TEL. 38-136
CHARLESTON, W. VA.

NEW and REBUILT

CONVEYORS BELT or DRAG

TRUCK SCALES
COAL CRUSHERS
COAL DRILLS
MINE FANS
MINING & STRIPPING
EQUIPMENT

WHAT DO YOU NEED?

INDUSTRIAL EQUIPMENT CORP.
910 First National Bank Bldg. Atlantic 6387

LOCOMOTIVES FOR SALE

- 2—65 ton, Whitcomb diesel-electric, new 1943, 566 HP, tractive effort 43,300.
- 1—45 ton, Davenport, diesel-electric railway type, new 1942, four traction motors, rear end cab.
- 2—25 ton, General Electric, diesel-electric, new 1942, Cummins diesel unit, speed 20 MPH.
- 2—80 ton type 0-6-0 steam switching locomotives, new 1942-44, 21"x28" cylinders, tractive effort 40,000.

LOCOMOTIVE CRANE

- 30 ton Capacity Browning Model 3-G, serial 3181, new 1943, 60' boom, double drums, excellent condition.

AIR DUMP CARS

- Six 22 cu. yd. Austin Western air dump cars, cast steel truck side frames, lift door type, ready to work.

SPECIAL — FORGING MACHINE, NEW 1945 — ACME MODEL "XN"

Our stock includes many other locomotives, cars cranes and heavy equipment items.

We invite your inquiries.

Write — Phone — Wire

PAN-AMERICAN ENGINEERING CO.
P. O. Box 2576 Telephone L.D. 339
Dallas Texas

FOR SALE

- 2—150 HP Fairbanks-Morse Vertical engines with 125 KW DC generators. Sets Used two years. Excellent Condition.
- 2—5 x 5 Deming acid resisting plunger pumps, 2½ suction, track mounted, 42" gauge.
- 1—16" double roll Bonded Crusher with motor.
- 1—15-ton Fairbanks Scale, 34 feet long.
- 1—112 AA Goodman 50 HP cutting machine.
- 1—3-ton GE Locomotive.

MASON & SONS COAL CO., INC.
Coshocton, Ohio

FOR SALE

- 1—Chuse Engine 13"x16" Bore, 225 RPM, Shop No. 1799 connected to Gen. Electric Direct Current, 250 Volt, 300 Amps., Generator type, T.D.R.—7-6-75 KW, 300 Amperes, working pressures 150# and 15#.
- 1—Murray 4 Stage bleeder type Turbine, directly connected to Crocker Wheeler Generator. Turbine #1130 Steam pressure, 150# and 27" Vacuum. Extraction pressure 40# output in HP, 140 output in KW 75, RPM 5,270. Generator 1,800, 250 Volts Direct Current, 300 Amperes, #712913.
- 1—Ideal Engine direct connected to a 75 KW Crocker Wheeler Generator. The above engines and generators can be seen in operation at this time. Other engine and boiler room equipment will be available.

BOOTH COLD STORAGE COMPANY

1220 N. Main St. St. Louis 6, Mo.



MOORHEAD

ELECTRICAL MACHINERY CO.
PITTSBURGH 19, PA.M-G SETS—ROTARIES
(3 ph. 60 cy.)

- 500 KW Dest. factory built M G Set—running inspection—consisting of 500 KW 250 v. 900 RPM cpd. interpole dir. conn. common base 714 HP Syn. Motor & P.F. 2300 v. with manual starting panel including magnetic excitation relays, also standard DC Panel. Good condition. Immediate shipment.
- 300 KW 250 v. G.E. 600 RPM Rotary Bare.
- 100 KW West. SK 125 v.—150 HP West. Ind. 1200 RPM. 220/440 v.
- 150 KW West. 125 v.—250 HP Ind. 2200 v.
- 100 KW 250 v. G.E.—150 HP Ind. West.
- 75 KW 75 v. West.—100 HP West. Ind.
- 50 KW 125 v. G.E.—75 HP G.E. 2200 v.
- 40 KW 250 v. West.—60 HP West. Ind.
- 15 KW 125 v. Wotten—25 HP 220/440 v.
- 10 KW 125 v.—15 HP Master. 220/440 New.

AC AND DC GENERATORS

- 45 KW 250 v. S West. 1000 RPM.
- 60 KW 60 v. 1000 amp. West SK Welding.
- 150 KW West. SK 125 v. 1200 RPM.
- 300 KW West. 250 v. 1200 RPM.
- 150 KW G.E. Type RC 550 v. 1150 RPM.
- 90 KW 60 v. 1500 amps. West. SK.

AIR COMPRESSORS

- 1100 cu. ft. 100 lbs. Chg. Pneu. 2 stage. 19" & 12"x12" with Intercooler, aftercooler, unloader, air receiver dir. conn. 215 HP West. Syn. Motor 2200 v. 3 ph. 60 cy. 257 RPM with belted 8 KW SK West. exciter and manually operated starting panel. Good condition. Immediate shipment.
- 750 cu. ft. 100± pres. Chic. Pneu. 2 stage Type OCB 17 & 10 x 12".
- 356 cu.ft. 100± pres. Chic. Pneu. 12 x 10.
- 245 cu. ft. 100± pres. Ing. Rd. ERI. 10 x 10.
- 175 cu. ft. 100± pres. Chic. Pneu. 9 x 8.
- 164 cu. ft. Ch. Pneu. Steam Type.

AC MOTORS (3 ph. 60 cy.)

HP.	Make	Wdg.	Spd.	Type
300	West.	S.R.	600	CW
300	G.E.	S.R.	450	I M

150	G.E.	S.C.	435	I K
150	G.E.	Swn.	600	ATI
125	West.	Syn.	277	I-M
100	G.E.	S.R.	450	MTC
80	G.E.	S.R.	900	CS
75	West.	S.C.	450/900	I M
75	G.E.	S.R.	600	ITC
75	G.E.	S.R.	575	I-K
50	G.E.	S.R.	900	CW658 D
50	West.	S.R.	600	I M
50	G.E.	S.R.	900	I M
50/12½	G.E. 2200 v.	S.R.	900/450	I M
25	Cr. Wh.	S.R.	580	
25	Cr. Wh.	S.C.	880	

LOCOMOTIVES

Haulage and Gathering Locomotives

- 20 Ton Jeff. & G.E. 550 v. 42" Ga.
(Can be rewound 250 v.)
- 13 Ton West. 260 x. 36 or 40" Ga.
- 8 Ton Goodman Explosion tested 500 v. 42/44" Ga.
- 6 Ton West. 250 v. 904 Motors 36" Ga.

STORAGE BATTERY LOCOMOTIVES

- 6/7 Ton Jeffrey 42/44" Ga. BB Motors.
- 8 Ton G.E. perm. 36/44" Ga. HM 825 BB.
- 5½ Ton Ironton Type A 36/42 Ga.

DC MOTORS

HP.	Make	Voltage	Wdg.	Speed
15	West. SK 110	230	cp.	750
15	West. SK 83	230	cp.	950
15	Cr. Wh. CM	230	sh.	1400/1700
20	West. SK 70L	230	cp.	1750
20	Cr. Wh. CMC	230	sh.	1200/1700
20	G.E. DLC	500	sh.	400/1200
20	West. SK 110	230	sh.	900
25	West. S.	230	sh.	325/975
25	West. SK 113	230	cp.	900
40	G.E. RC 34	230	sh.	750
40	G.E. RC	230	sh.	1150
50	West. SK	230	sh.	1750
50	West. S	230	cp.	875
60	Rel. T461	230	sh.	800/1200
125	West. SK 193	230	sh.	450/1000
200	G.E. RC	500	cp.	875
375	West.	230	cp.	430/860

ENGINE & TURBINE UNITS

- 8-cyl. Sterling Gas or Gasoline Engines. 72 HP at 800 RPM to 210 HP at 2,000 RPM.
- 50 KW West.—Turbo 125 v.
- 100 KW Delco 250 v. Gen.—Superior Diesel.
- 300 KW West. 125/250 v. DC—West. Turbine 440± Pres.
- 2-400 KW G.E. 250 v.—Skinner Steam Eng.

HOISTS, CRANES AND PUMPS

- 400 HP Vulcan conical drum shaft Hoist.
- 400 HP Vulcan single fixed cylindrical drum 78" dia. 5' 4" wide—AC Motor.
- 75 HP Diamond sgl. fr. 48" dia. 25" face.
- 75 HP Mead Morrison sgl. fr. drum—AC Motor.
- 1-50/75 HP 2 drum Meade Morrison slope.
- 40 HP Ligerwood sgl. ft. drum geared to A.C.
- 25 HP sgl. friction Hoist—230 v. DC Motor.
- 10 Ton Larry Car. 500/250 v. DC.
- 10 HP Fridy Car Puller. AC Motor.
- Lawrence Cent.—50 HP. AC Motor.
- Gardner Cent.—50 HP. 230 v. DC Motor.
- Weinman Cent.—50 HP. 230 v. DC Motor.

TRANSFORMERS

Qu.	KVA	Make	Prim. V.	Sec. V.
3	200	Pgh.	2200	220/440
3	150	Westgh.	2200	220/440
3	15	Penna.	2200	110/220
5	10	Penna.	2200	110/220
3	10	West.	2200	110/220

DC MAGNETIC STARTERS

- 3—10 HP 230 v. Mag. Rev. Dyn. Braking.
- 1—25 HU C.H. 230 v. dripproof.
- 4—30 HP EC & M. 230 v. Magnetic.
- 3—40 HP W.L. 230 v. dripproof.
- 4—60 HP C.H. 230 v. dripproof.
- 4—75 HP C.H. 230 v. dripproof.
- 1—100 HP C.H. 230 v. dripproof.
- 1—150 HP C.H. 230 v. dripproof.

AC MAGNETIC STARTERS

- 6—43¼ Clarke Mche. Tool 440/3/25 cy.
- 2—700 HP West. 220/3/60 Line Starters.

SUBSTATIONS

- 4—150 kw General Electric Synchronous Motor-Generator Sets, complete, 275 volts or 250-300 volts DC—2,300/4,000 volts AC, 3 phase, 60 cycle; 1,200 rpm. Type ATI Motor; Type MPC Generator.
- 2—200 kw, 1,200 rpm., 250 volt DC, pedestal type G. E. Rotary Converters, with transformers and switchboards.
- Also motors, transformers & control.

R. H. BENNEY EQUIPMENT CO.

5024 Montgomery Road
Norwood 12, Ohio

HOIST FOR SALE

Single Drum 8' dia. x 5'6" long. 200 HP, heavily constructed and in excellent condition. With automatic controls.

G. & W. H. CORSON, INC.

Plymouth Meeting, Pa.

FOR SALE

100 KW

DIESEL GENERATORS

DIRECT CURRENT

260/340 VOLTS—G.E. COMPOUND WOUND GENERATOR

150 H.P. GENERAL MOTORS DIESEL MODEL 3-268A—1200 R.P.M.

COMPLETE WITH SWITCHBOARD, CONTROL PANELS, ETC.

SLIGHTLY USED—EXCELLENT CONDITION

CERTIFIED MATERIALS SUPPLY, INC.

534 W. 12th Newport, Ky.

COlonial 5139

LOOK—BUY—SAVE

Real Bargains

COPPER WIRE

- 4/0 Grooved Trolley
- 1,000,000 CM—500,000 CM Bare

MINE CARS

- 3 Ton, 48" Gauge, 29" high

HOISTS

- Single and Three Drum—New

HAND WINCHES

- All-Steel, Three Ton Capacity

WELDERS

- 400 Amp Lincoln, 220/440 Volt
- Also 300 Amp New Gas Welders

TANKS

- 8,000 — 10,000 — 12,000 Gallons

I BEAMS

- 10 Inch—Heavy Section

ROTARY CONVERTERS

- General Electric, 50 KW, 2300 primary, 275 DC volts

MANSBACH METAL COMPANY

Logan, W. Va.

Phone 1071

We Buy, Sell, Trade — What Have You?

G. M. MARINE DIESEL Available

Model 6-278A Marine Diesel Engine, 600 S.H.P., Serial #10350
manufactured by Cleveland Diesel Engine Division, General Motors, complete with D.C. electric generator set and spare parts.

• This Diesel Engine used only for observation purposes on a test stand in U. S. Navy Diesel Training School at Cleveland, Ohio —never been in actual use on ship—good as new. Included with engine is a 300 KW General Electric D.C. generator set in-

stalled on sub base of engine—also eight boxes of new spare parts and exhaust muffler.

Original cost to Government in 1942 — \$40,000.

Write for itemized list—attractively priced.

PETRUS INDUSTRIAL MACHINERY SALES

1486 West 25th Street

Tel. MAin 1203

Cleveland 13, Ohio

IMMEDIATELY AVAILABLE—MINING EQUIPMENT

MINING MACHINES

Jeffrey: 2—35B, 28A, 250 V. 1—24B Low Vein.
4—29B, 29C, 29CE with shearing head. Also 1
on cast. Revolving head for 29C. 2—Longwall 24B.
Goodman: 12A, 12AB, 12AA, 12G3A, Shortwalls.
124 EJ Slabbers.
1—12G3, 220 volt.
1—Hitch Cutter for Cross Head timbers.
2—Goodman Slabbing Machines, permissible type,
250 and 500 volts.

Sullivan: CE7, CE9.

SUBSTATIONS—275 volts, D. C.

1—75 KW G. E. Rotary Converter.
250 volt D. C. transformers.
220-440—2300/4000.
1—300 KW W. H. 3 phase converter.
275 D. C. transformers 4000/6600 A. C.
1—100 KW W. H. MG Set.
275 D. C. 2300 volt A. C.
1—100 KW G. E. MG Set.
275 D. C. 440 volt 400 A. C. in portable build-
ing.

LOCOMOTIVES

Goodman: All 250 volts.
1—6 ton, 30 B 43" 1—5 ton, 2600-B.
1—5 ton 8-30 36" gauge.
1—6 ton type 8A.
Westinghouse Units: All 250 volts.
906, 102, 904 and 115.
Bar steel frames 10 ton, 6 ton, and 4 ton.
G. E.: All 250 volts.
6 ton 803, 44" as is.
8 ton 839.
1—8 ton type HM 61, 36" gauge.

LOCOMOTIVES

5 ton 825, 44" and 36".
8 ton 839.
2 motors for 8 ton 839.
Jeffrey: 8 ton, 250 volts, type MH73. 1—4 ton MH
12, Locomotive motors and Crabs and Reels for
Locomotives.

SPARE ARMATURES

Jeffrey: MH110, MH78, MH73 and MH64-350 V.
and 500 V. 29B, 35B and 28A, 35BB, 35A, 29C,
29L, 35L.
Goodman: 30B, 30C, 12A, 12AB, 12AA.
General Electric: 801, 819, 821, 825, 839, 61.
Westinghouse: 904, 905, 102, YR2, 115, 250 V.
Bracket Type, 150 KW G. E., HCC.
Sullivan: CE7, CE9 and CE10.

OTHER ITEMS AVAILABLE

Aerial Tramways.
Belt Conveyors: 1 Bucket Elevator Conveyor.
Bit Sharpeners: 2 Sullivan, 1 Diamond.
Blue Print Machine: 42" wide, continuous Mercury
Arc Light.
Bond Welders: Resistance.
Circuit Breakers: AC and DC.
Circuit Breakers, Automatic: 250 volt, 600 amps.
Circuit Breakers, Manual: 600 amps to 3,000 amps.
Coal Crushers: (double roll) 16"x16", (single roll)
24"x24", 30"x30", 18"x18", 12"x16".
1—Pulverizer 30" Williams #3 Coal Crusher.
Conveyors: Scraper type. Apron and grate bar
screening type.

OTHER ITEMS AVAILABLE

Compressors & Jackhammers, Compensators.
Drop Bar Supports: (Gooseneck) 29B and 29C.
1 Revolving head for 29C.
Dumps: Crossover.
Field Frames.
Generators: DC 250-275 volt, 30 KW to 100 KW.
1—AC Generator, 31.3 KVA, 3 ph. 208 volt, Gen-
eral Electric with Exciter.
Hoists, overhead: AC 3-60-400 1 ton and 2 ton.
Crabs and Room Hoists. Also single and double
drum.
Lathes: 48"x14" with Taper Attachment and
3-60-220 Motor.
Loading Machines: 2—Myers-Whaley #3 and 4.
1—IBU Joy loading machine.
1—12BU Joy loading machine.
Milling Machines: horizontal and vertical.
Mining Machine Trucks and 2 on Catts. for short-
wall and are wait.
Monitors.
Motor Starters and Controllers: AC and DC.
Synchronous Motor Starters, full magnetic, across
the line. 3-60-4150, 2—200 H.P. and 7—250 H.P.
1—165 H.P., 440 volt for slip ring motors.
1—100 H.P., 250 volt D.C. Both reversible.
Pumps: Rebuilt and New.
Scales: Mine Car and Truck.
1—Slate Larry.
1—Car haul trip maker.
Transformers: 4—55 KVA 23,100/12,000 to 103/208.
3—35 KVA. 22,000/12,000 to 178/89 volts. 3—100
KVA KVA 6600/12,000 to 2300.

GUYAN MACHINERY COMPANY, Logan, W. Va.

CRAWLER AND LOCO CRANES

1—25 ton Marion Diesel Crawler 1½ yd.
shovel front D/L attachm'ts. 60" bm.
D13000—Caterpillar Diesel engine, 33"
cat, first class condition.
1—¾ yd. same as above, Marion No. 332.
2—¾ yd. Buckeye Gas Shovels and Cranes.
1—Link Belt K45 Crane and D/L 70" bm.
Wise.
1—2½ yd. Koehring Diesel D/L Crane with
80' boom.

MINE AND SLOPE HOISTS

1—40000± Vulcan Dbl. Drum AC.
1—35000± Nordberg Sgl. Drum AC.
1—10,000 lb. cap. Vulcan Sgl. Drum Hoist
4" x 4" drum 250 HP, AC.
1—5,000 lb. cap. Lidgewood Sgl. Drum Elec-
tric Hoist, 600 FPM, GE motor, 100 HP,
AC.

HOIST MOTORS

1—200 HP, GE 2300/3/60 AC 585 RPM Mo-
tor with control.
1—225 HP, GE Motor for 440/3/60 AC, 585
RPM with control.
1—300 HP new Allis Chalmers slip ring mo-
tor 600 RPM for 2300/4000 AC.

CONVEYORS

1—1275 ft. 42" belt Conveyor with drive.
1—300 ft. 60" ditto.
1—275 ft. 48" ditto.

CRUSHERS

1—24 x 24 Bbl. Roll Crusher.

DIESEL MOTORS

3—6 cyl. 280 HP Cummings Diesel Motors.
GENERATING UNIT
1—750 KVA Westhse 440/3/60 AC Genera-
tor with Nordberg Uniflow Steam En-
gine, complete. Bargain.

AERIAL TRAMWAY

1—Aerial Cable Tramway, 1250 ft. long x
1¼" rope with haul rope. Motor 60 HP,
AC.

COMPRESSORS

1—600 ft. Ir. 2 stage motor driven com-
pressor, Imperial Type for 220/440/3/60
AC.
1—900 ft. Sullivan WJ Angle Compound
Compressor with 150 HP, GE Motor,
220/440/3/60 AC.

DERRICKS

1—25 ton, 3 drum Stiff Leg Derrick with
90' bm., AC.

HAWKINS AND CO.

154 So. Michigan Ave. Chicago 3, Ill.
Phone: HAR. 0725

FOR SALE

1—450 H.P. Hardie-Tynes Electric Mine
Hoist. Drum 72" x 50" face, Capacity
4,000—1¼" rope, Rope pull 17,500 lbs.
Speed 1,200 F.P.M. New Split extra
drum.
1—450 H.P. Electric Mfg. Company Mine
Hoist Motor and control with hoist, ex-
cellent condition.
1—150 Hardie-Tynes Mine Hoist, single
drum, double reduction with 150 H.P.
slip-ring mine hoist motor, no control.
2—60 ton Steam Switcher Locomotives—
0-6-0 Excellent condition.
1—5x22 Silx Lined Tube Mill with 150
H.P. drive motor, no control.

R. E. BOGGS

1427 South 18th St. Birmingham, Ala.
Telephone 7-8252

BUY FROM STOCK

Caldwell 200 tons Horiz. Hydraulic Wheel Press.
Oilgear 20,000± Hydraulic Horiz. Broach.
LeBlond 36"x30" Q.C.G. Engine Lathe.
Cincinnati #4 and #5 High Power Horiz. Millers.
American 24" Motorized Crank Shaper.

FALK MACHINERY COMPANY
18 Ward St., Rochester, N. Y.

EXCAVATOR FOR SALE

1941. Model 255A, P & H, serial 6559, equipped
as a dragline with a Waukesha gasoline engine, 35'
boom, 2 boom point sheaves, 20" grouser shoes, and
a spring type tagline winder. Just overhauled and
in excellent condition—\$9,500.00.

CARL C. SIMPSON

EAST LIMA STREET FOREST, OHIO

Use National

CLASSIFIED ADVERTISING

for bringing business needs or opportu-
nities to the attention of men associated
in administrative, executive, manage-
ment, sales and responsible technical,
engineering and operating capacities with
the industries served by McGraw-Hill
publications.

For advertising rates or other information address:
Classified Advertising Division

McGRAW-HILL PUBLISHING CO., Inc.

330 W. 42nd St., New York 18, N. Y.

FOR SALE

1—50 K.V.A., 3 phase, 60 cycle 200-220 volts,
Packard Transformer, \$350.00.
1—#25, 220 volt, Syntron Electric Hammer,
\$75.00.
1—Model 63, 220 volt Miller 300 amp., resistance
welder, \$75.00.

RALEIGH MINING CORPORATION
R. D. 4, Sanford, N. C.

REBUILT MINING MACHINES

- 4-112 A A. Goodman Universal D.C.
- 1-112 G 3 A. Goodman Universal, 220 volts A.C.
- 4-C-E-7 Sullivan A.C. and D.C.
- 1-7-B Sullivan D.C., 250 volts.

LOCOMOTIVES

- 2-6-ton Goodman type 33 Ball Bearing.
- 1-8-ton Goodman type 32 Ball Bearing.
- 1-6-ton G. E. 42-inch gauge.
- 1-5-ton Mancha Storage Battery Locomotive.
- 42-inch Track Gauge, height 40", complete with Storage Batteries and Charging Panel.

LOADING MACHINES

- 2-8 B. U. Joy, 42-inch gauge on cats.
- 3-5 B. U. Joy, 42-inch gauge on cats.

THOMAS GILLESPIE & SONS

State Rd. 67 - Bicknell, Ind.
Phones 179 and 149 L. and 149 K.

**BARGAIN - FOR SALE
100 KW. DIESEL ENGINE
GENERATOR SETS**

- 11-100 KW., 250/275 V. D.C. Delco Generators dir. con. to 150 HP., Model GBD-8, 5½x7, 8 cyl. Superior Diesel Engines, elec. starting with muffler, power panel and accessories.
- Practically as good as new - Only Used for Spares.

DUQUESNE ELECTRIC & MFG. CO.
Pittsburgh 6, Pa.

- 1-300 Ton Caldwell Horizontal Wheel Press.

- 1-Niles Bement Pond Wheel Lathe. Will turn up to 42" Wheels.

Write or Wire for Details

**FRANK M. JUDGE
& COMPANY, INC.**
7010 Empire State Bldg.
New York 1, N. Y.

**NEW and REBUILT
STORAGE BATTERY**

LOCOMOTIVES

1½ to 10 Ton 13" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Pa.

SHAKER CONVEYOR

Two (2) 15 HP, 230 volt, Goodman Type G15B82 Shaker conveyor, underneath drive, complete with Type EIC size 1 duck bill, 600 feet of BIAWG13 standard troughs, size 1, swivels and ball frames.

This equipment is in A-1 condition and is now in use, however, it is available for immediate delivery. Price \$7,800.00.

Jones and Heatherman Coal Co.
PEACH CREEK, W. VA.

**for IMMEDIATE DELIVERY
of RUBBER PRODUCTS**

CALL WIRE

WRITE CARLYLE
THE RUBBER HEADQUARTERS

CONVEYOR BELTING,
TRANSMISSION BELTING,
ELEVATOR BELTING,
FIRE, WATER, AIR,
STEAM, SUCTION and
WELDING HOSE.

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"	24"	4	1/8"	1/32"
42"	5	1/8"	1/16"	20"	5	1/8"	1/32"
36"	6	1/8"	1/16"	20"	4	1/8"	1/32"
30"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	5	1/8"	1/16"	16"	4	1/8"	1/32"
26"	5	1/8"	1/32"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

ENDLESS "V" BELTS

HEAVY-DUTY FRICTION SURFACE

	Width	Ply	Width	Ply	Width	Ply
In-	18"	6	10"	6	6"	5
quire	16"	6	10"	5	5"	5
For	14"	6	8"	6	4"	5
Prices -	12"	6	8"	5	4"	4
Mention	12"	5	6"	6	3"	4
Size and						
Lengths.						

- "A" Width All Sizes -
- "B" Width All Sizes -
- "C" Width All Sizes -
- "D" Width All Sizes -
- "E" Width All Sizes -

Sold in Matched Sets.
Inquire For Prices -
Mention Size and Lengths.

SPECIAL OFFER . . . HEAVY DUTY RUBBER HOSE

FIRE HOSE

APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED		
I.D. Size	Length	Per Length
2½"	50 feet	\$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

AIR HOSE

I.D. Size	Length	per Length	Universal Couplings
½"	25 feet	\$5.00	\$1.50 Pair
	50 "	10.00	1.50 Pair
¾"	25 "	7.50	1.50 Pair
	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
	50 "	20.00	1.50 Pair

LARGER SIZES ALSO AVAILABLE
All Prices-Net - F.O.B. New York

WATER HOSE

I.D. Size	Length	per Length	I.D. Size	Length	per Length
¾"	25 feet	\$4.25		35 feet	\$10.50
	50 "	8.00		40 "	12.00
1"	25 "	6.25		50 "	15.00
	50 "	12.50	1½"	25 "	10.00
1¼"	25 "	7.50		35 "	14.00
				50 "	20.00

Each Length with Couplings Attached

CARLYLE RUBBER CO., Inc.

62-66 PARK PLACE, NEW YORK 7, N. Y. Phone: BArcley 7-9793

**FOR SALE
MINE CARS**

15 Sanford-Day all-steel drop bottom 42" gauge ballbearing. Approximately 12"x6"2"x2"2" cap. 4 ton crowned, first class. Sold subject to inspection.

BRUCE PRATER
Pikesville, Ky.

LOCOMOTIVES & CRANES

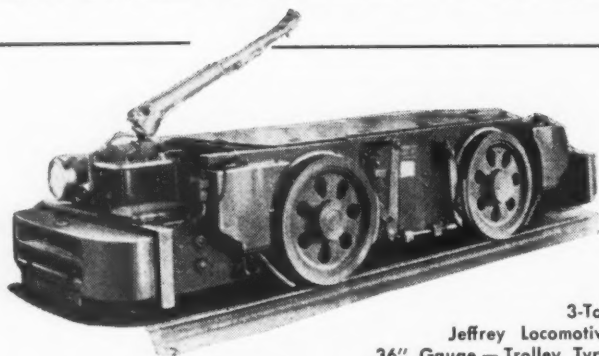
- 80 ton Lima 6 wheel Switchers. New 1944.
- 65 ton Whitcomb Diesel-Electric. New 1944.
- 50 ton Gen. Elec. Diesel-Electric.
- 70 ton Porter Fireless steam locomotive.
- 30 ton Plymouth Gas Locomotive. New 1944.
- 2 yd. Lima Diesel Crawler Crane. 100' bm.

MISSISSIPPI VALLEY EQUIPMENT CO.
511 Locust St. St. Louis, Mo.

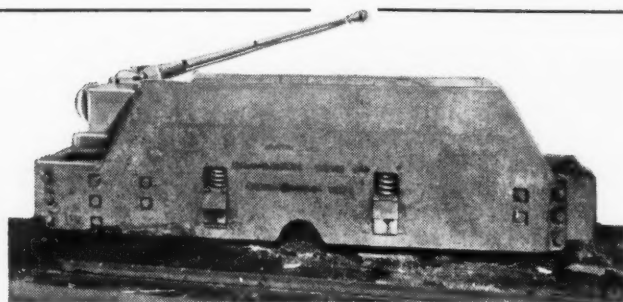
COMPLETE LIQUIDATION

... New and nearly new coal mining machinery and equipment

IMMEDIATE DELIVERY



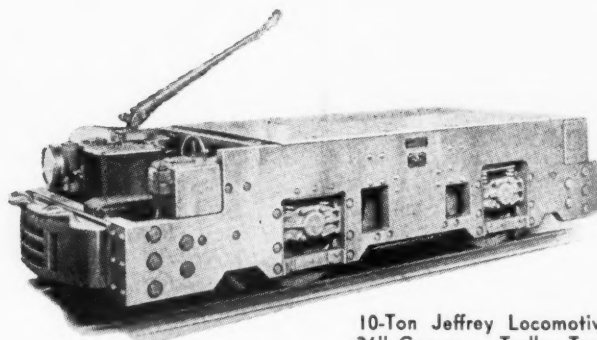
3-Ton
Jeffrey Locomotive
36" Gauge — Trolley Type



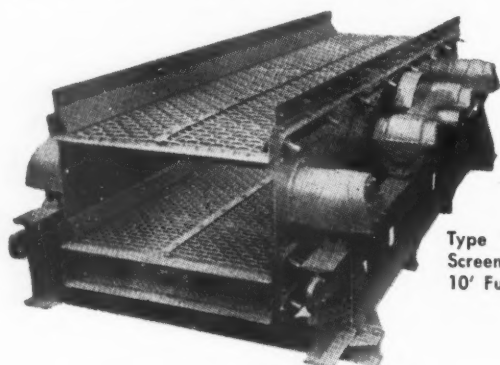
20-Ton Goodman Locomotive Trolley Type — 36" Gauge



6-Ton Jeffrey Locomotive 36" Gauge — Trolley Type



10-Ton Jeffrey Locomotive
36" Gauge — Trolley Type



Type F-600 Ty-Rock
Screen 2—surface 5' x
10' Full Floating.



8-Ton General Electric Trolley
Type Locomotive—36" Gauge

THE COLUMBINE MINE EQUIPMENT CO., INC.

FLAT IRON BUILDING, 1669 BROADWAY

DENVER 2, COLORADO

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

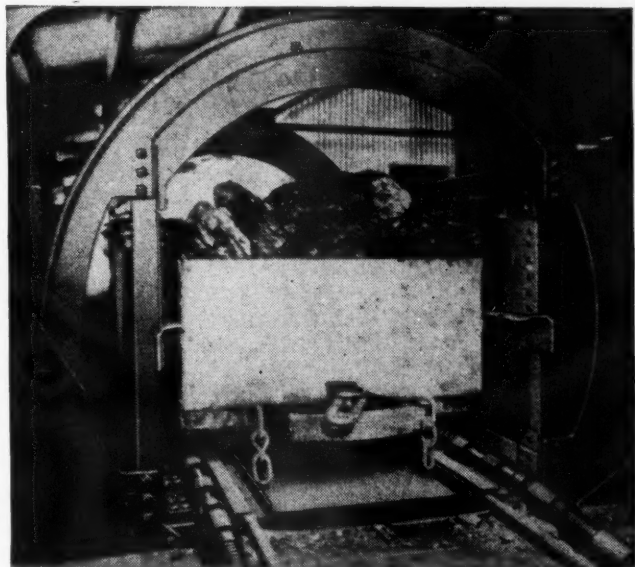
WRITE FOR OUR COMPLETE LIST OF MACHINERY AND EQUIPMENT

SEE PAGE 205 FOR APPROXIMATE SUMMARY OF HARD-TO-GET OFFERINGS

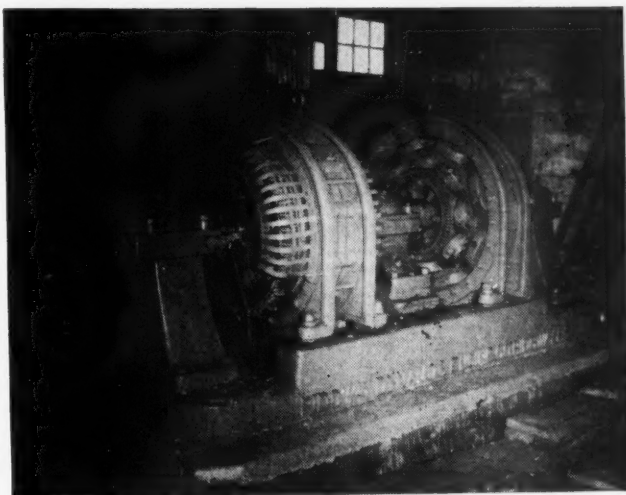
COMPLETE LIQUIDATION

... New and nearly new coal mining machinery and equipment

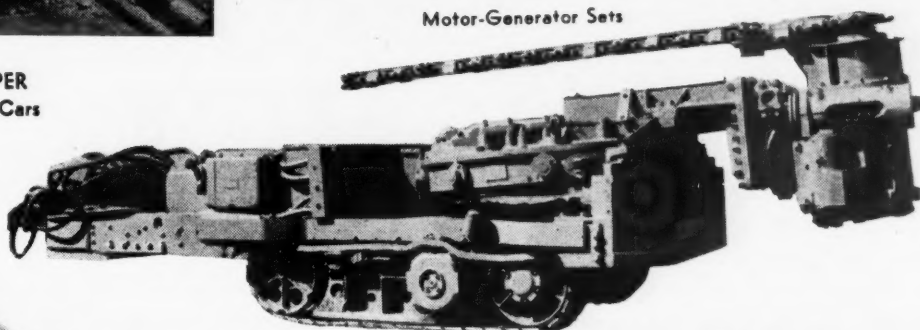
IMMEDIATE DELIVERY



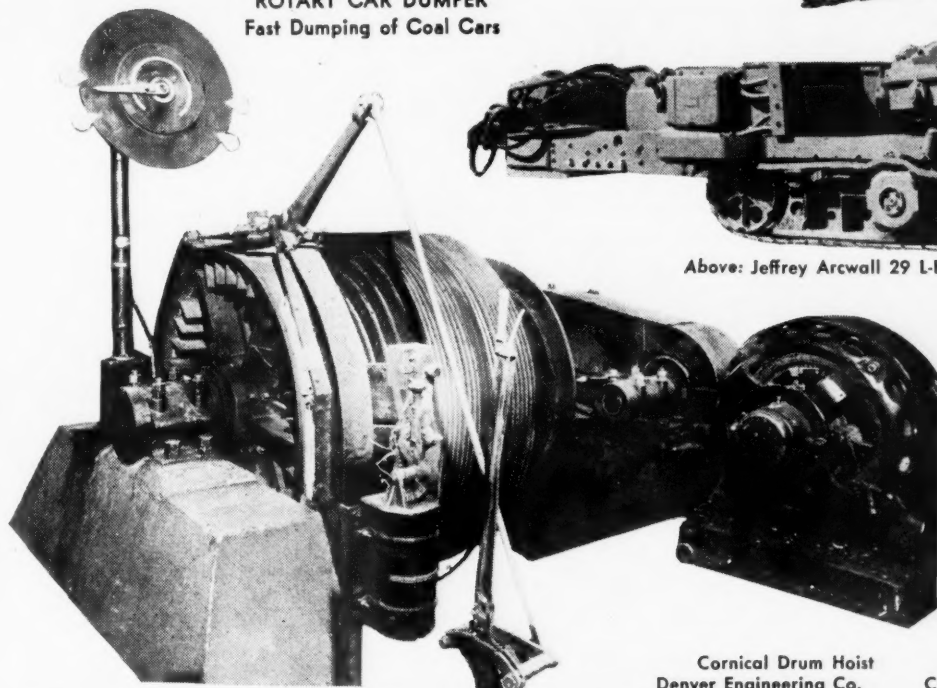
ROTARY CAR DUMPER
Fast Dumping of Coal Cars



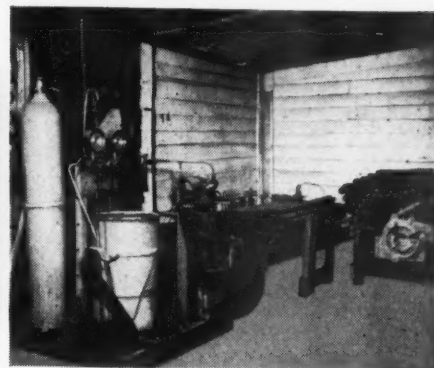
Motor-Generator Sets



Above: Jeffrey Arcwall 29 L-E Mining Machine. Caterpillar Mounted.



Cornical Drum Hoist
Denver Engineering Co.



Complete Cardox Plant — 160 Shell Capacity

THE COLUMBINE MINE EQUIPMENT CO., INC.

FLAT IRON BUILDING, 1669 BROADWAY

DENVER 2, COLORADO

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

WRITE FOR OUR COMPLETE LIST OF MACHINERY AND EQUIPMENT

SEE PAGE 205 FOR APPROXIMATE SUMMARY OF HARD-TO-GET OFFERINGS

COAL AGE ADVERTISERS IN THIS ISSUE

An asterisk preceding manufacturer's name indicates detailed information may be found in the 1947-48 MINING CATALOGS

*Acker Drill Co.	158
Air Reduction Co.	187
*Allis-Chalmers Mfg. Co.	21, 37, 47, 53
*Allis-Chalmers Tractor Div.	10-11
*Aluminum Co. of America	144
*American Brattice Cloth Corp.	186
*American Car & Foundry Co.	31
*American Crucible Products Co.	162
*American Hoist & Derrick Co.	194
American Manganese Steel Div.	
American Brake Shoe Co.	179
American Optical Co.	190
*American Pulverizer Co.	30
Anaconda Wire & Cable Co.	133
Armco Steel Corp.	146
Ashland Oil & Refining Co.	183
Atlas Powder Co.	32
Aurora Pump Co.	201

*Barber-Greene Co.	143
*Bemis Bro. Bag Co.	164
*Bethlehem Steel Co.	6, 56
*Bird Machine Co.	7
Bituminous Casualty Corp.	170
*Bixby-Zimmer Engrg. Co.	184
Boston Woven Hose & Rubber Co.	55
Bucyrus-Erie Co.	50

Cambridge Wire Cloth Co.	167
Cardox Corp.	57
Caterpillar Tractor Co.	46
Centrifugal & Mechanical Industries, Inc.	170
Cheatham Electric Switching Device Co.	202
Chesapeake & Ohio Railway	8
Chevrolet Motor Div., General Motors Corp.	58
Chicago Perforating Co.	202
*Chicago Pneumatic Tool Co.	68
*Cincinnati Mine Machinery Co.	189
Clarkson Mfg. Co.	149
Coffing Hoist Co.	160
*Connellsville Mfg. & Mine Supply Co.	160
Crane Co.	54
Cummins Engine Co.	9

Davidson Co., Cyril	182
Davis Creosoting Co.	164
Dings Magnetic Separator Co.	184
Dodge Div., Chrysler Corp.	185
*Dravo Corp.	184
Duff-Norton Mfg. Co.	154
duPont de Nemours & Co., E. I., Explosives Dept.	150

Eaton Mfg. Co.	Insert between pp. 36-37
*Edison Storage Battery Div. of Thomas A. Edison, Inc.	14
*Electric Storage Battery Co.	113
*Ensign-Bickford Co.	72
*Enterprise Wheel & Car Corp.	171
Eriez Mfg. Co.	139

Fairbanks-Morse Co., Pomona Pump Div.	166
*Farmers Engrg. & Mfg. Co.	174
Fawick Airflex Co.	161
Flexible Steel Lacing Co.	199
*Flood City Brass & Electric Co.	202

Gates Rubber Co.	20
General Electric Co., Apparatus Dept.	22-23
*Goodman Mfg. Co.	28-29
Goodrich Co., B. F.	1
Goodyear Tire & Rubber Co.	15
Gordon Lubricating Co.	24
*Gorman-Rupp Co.	151
Greensburg Machine Co.	186
Grinnell Co.	165
Gulf Oil Corp.	59
Gulf Refining Corp.	59
*Guyan Machinery Co.	158

Harnischfeger Corp.	137
Harnischfeger Corp., Welding Div.	132
*Hazard Insulated Wire Works	4
*Hazard Wire Rope Div. of American Chain & Cable Co.	Third Cover
*Hendrick Mfg. Co.	164
Hercules Powder Co.	153
Hewitt Rubber of Buffalo, Div. of Hewitt-Robins, Inc.	65
*Hoffman Bros. Drilling Co.	202
*Holmes & Bros., Robt.	156
Hulburt Oil & Grease Co.	2-3

*I-T-E Circuit Breaker Co.	134
*Independent Pneumatic Tool Co.	131

Indiana Foundry Co.	198
International Harvester Co.	123
International Salt Co.	192

*Jeffrey Mfg. Co.	
Insert between pp. 20-21	121
Jones & Laughlin Steel Corp.	169
Jones Foundry & Machine Co., W. A.	155
*Joy Mfg. Co.	17, 33, 70-71

*Kennametal, Inc.	173
Kenworth Motor Truck Co.	36B
King Powder Co.	163
*Koehring Co.	34-35
*Kremser & Sons, Inc., Frank A.	202

*Laughlin Co., Thos.	138
*LeTourneau, Inc., R. G.	42-43
Lima Shovel & Crane Div., Lima-Hamilton Corp.	193
*Link-Belt Co.	Fourth Cover
Lubriplate Div., Fiske Bros. Refining Co.	136

Mack Trucks	117
McGraw-Hill Book Co.	198, 201
McGraw-Hill Catalog Service	196
*McLanahan & Stone Corp.	198
Michigan Pipe Co.	197
*Mine Safety Appliances Co.	39
*Mines Equipment Co.	147
*Mosebach Electric & Supply Co.	174
*Mott Core Drilling Co.	182

Nachod & United States Signal Co.	202
National Homes Corp.	191
*Nolan Co.	197

Ohio Brass Co.	26-27, 125
*Ohio Carbon Co.	172
Ohio Oil Co.	115
Osmose Wood Preserving Co. of America, Inc.	197

Pangborn Corp.	181
Paris Mfg. Co.	145
*Pennsylvania Crusher Co.	64
Pennsylvania Drilling Co.	198
Pittsburgh Gear Co.	119
Preformed Wire Rope Information Bureau	62

*Quaker Rubber Corp.	175
Queen City Machine Tool Co.	198

Robins Conveyors Div., Hewitt-Robins, Inc.	65
Roebling's Sons Co., John A.	41
Rollway Bearing Co.	195
Rome Cable Co.	141
*Ruberoid Co.	174

*Schramm, Inc.	143
*Screen Equipment Co.	152
Searchlight Section	203-215
*Simplex Wire & Cable Co.	25
Sinclair Refining Co.	60-61
Snyder & Swanson, Inc.	69
*Sprague & Henwood, Inc.	162
Standard Oil Co. (Indiana)	18-19
Stearns Magnetic Mfg. Co.	142
Sterling Steel Castings Co.	159
Sun Oil Co.	Second Cover

Texas Co.	12-13
*Thermoid Co.	51
Tide Water Assoc. Oil Co.	126
*Timken Roller Bearing Co.	135
Transcentral Oil Corp.	24

Union Pacific Railroad	38
Union Wire Rope Corp.	44-45
United Engineers & Constructors, Inc.	129
United States Rubber Co.	66-67
*Upson-Walton Co.	36

Victaulic Co. of America	140
--------------------------	-----

*Walter Motor Truck Co.	16
Walworth Co.	40
Webb Corp.	201
Wedge-Bar Screen Co.	172
*West Virginia Steel Co.	178
Westinghouse Air Brake Co.	176
*Westinghouse Electric Corp.	63
Whitney Chain & Mfg. Co.	52
*Wickwire Spencer Steel Div., Colorado Fuel & Iron Works	48

*Wilfley & Sons, Inc., A. R.	49
*Wilmot Engrg. Co.	157
Willson Products, Inc.	177
Wyandotte Chemicals Corp.	180

PROFESSIONAL SERVICES 188

SEARCHLIGHT SECTION (Classified Advertising)

EMPLOYMENT	
Positions Vacant	203
Positions Wanted	203

SPECIAL SERVICES	
Contract Work	203

BUSINESS OPPORTUNITIES	
Offered	203

PROPERTY	
For Sale	203

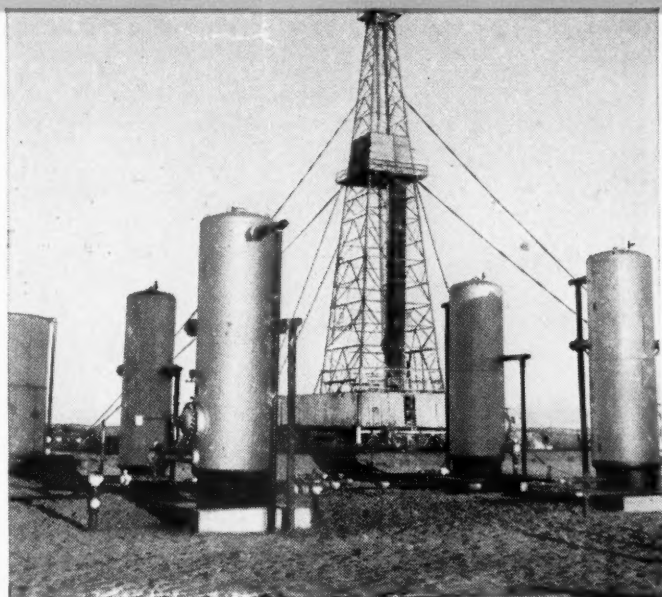
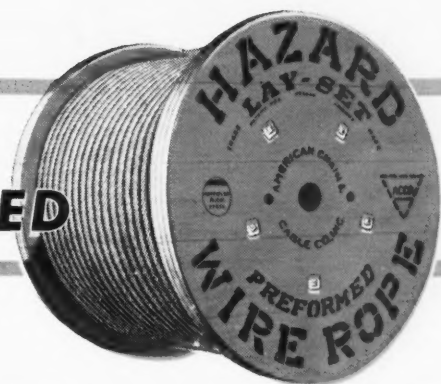
EQUIPMENT	
(Used or Surplus New)	
For Rent	203
For Sale	203-215

WANTED	
Equipment	203

ADVERTISERS INDEX

B & W Coal Company	203
Benney Equipment Co., R. H.	211
Boggs, R. E.	212
Bonded Scale Co.	206
Booth Cold Storage Company	210
Bradford Supply Co., Inc.	206
Carlyle Rubber Co., Inc.	213
Certified Materials Supply, Inc.	211
Cincinnati Machinery Co., Inc.	206
Coal Mine Equipment Sales Co.	210
Columbine Mine Equipment Co., Inc.	204, 205, 214, 215
Commercial Metals Company	208
Consolidation Coal Co.	203
Corson, Inc., G. & W. H.	211
Duquesne Electric Mfg. Co.	209, 213
Electric Equipment Co.	206
Electric Service Co., Inc.	203
Falk Machinery	212
Florence Machy. & Supply Co.	207
Foster Co., L. B.	206, 208
Frank, M. K.	208
Gavenda Bros., Inc.	209
Gillespie & Sons, Thomas	213
Greensburg Machine Co.	213
Guyan Machinery Co.	212
Harrison & Quinette Coal Co.	203
Hawkins & Co.	212
Hittmeier, John	203
Industrial Equipment Corp., The	210
Jones & Heatherman Coal Co.	213
Judge & Co., Inc., Frank M.	213
Kaiser Company, Inc.	210
Kirk Company, Wallace E.	210
Locke Company, C. B.	210
Lorraine, G. B.	203
MacCabe Co., T. B.	208
Mansbach Metal Co.	211
Mason & Sons Coal Co.	210
Midwest Steel Co.	208
Mississippi Valley Equipment Co.	213
Moorhead Electrical Machinery Co.	211
Morrison Railway Supply Corp.	208
O'Neill, A. J.	208
Pan American Engineering Co.	210
Petrus Industrial Machinery Sales	211
Philadelphia Transformer Co.	206
Prater, Bruce	213
Raleigh Mining Corp.	212
Simpson, Carl	212
Stanhope, Inc., R. C.	208
Swabb Equipment Co., Frank	203, 206
Union Supply Co.	206
Wagner Co., Arthur	206

Improved Performance with **LAY-SET** PREFORMED



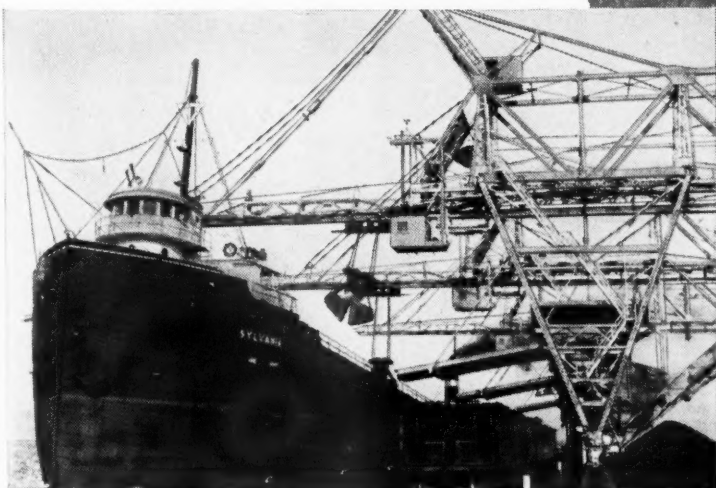
"Make hole" deeper—faster—is the demand in the oil fields. The deeper the hole goes, the greater the weight of drill pipe and tools. The faster it goes, the greater the shock loads in pulling and running in pipe. Hazard makes **LAY-SET** Preformed in Seale construction, with tough improved plow steel wires, and an independent wire rope core. **LAY-SET's** improved performance makes it **THE** rope for deeper, faster drilling.

The powerful "cat" and ravenous carrier-scraper cut down hills and fill in valleys. They make modern roads, airports, dams, and industrial sites—yes, even remove overburden in strip mining operations. Hazard's **LAY-SET** Preformed Streamlined Scraper Cable is designed for the tortuous sheaves and reverse bends that prove the quality of the rope. It will improve the performance of your equipment.



Coal and ore bridges hurry to load and unload ships and cars. The wire ropes travel fast as the 5, 10, 15-ton load speeds from ship to shore. Ropes whip. Quick starts and short stops mean extreme shock loads. Sharp steel edges mean cutting and abrasion. Tough conditions, but Hazard's **LAY-SET** is made in the right constructions for bridges. You can get the exact ropes that will improve performance and serve you best.

Whatever the field—logging, mining, building elevator, contractor, industrial, marine, or oil—Hazard wire ropes give you improved performance.



ACCO

Ask your distributor for **LAY-SET** Preformed, Green Strand Wire Rope
In Business for Your Safety

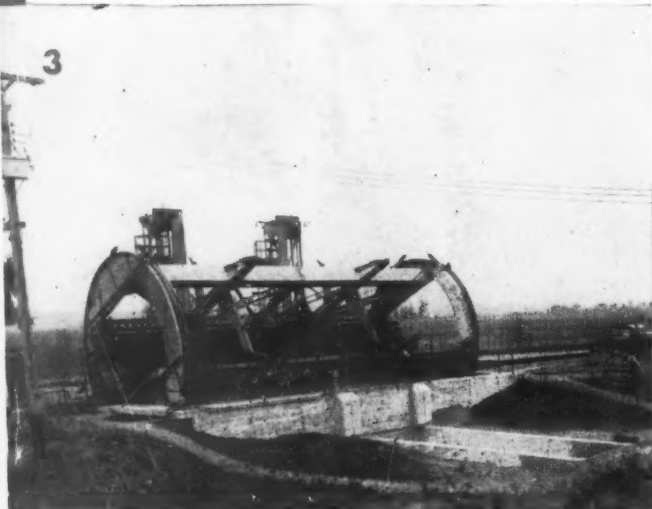
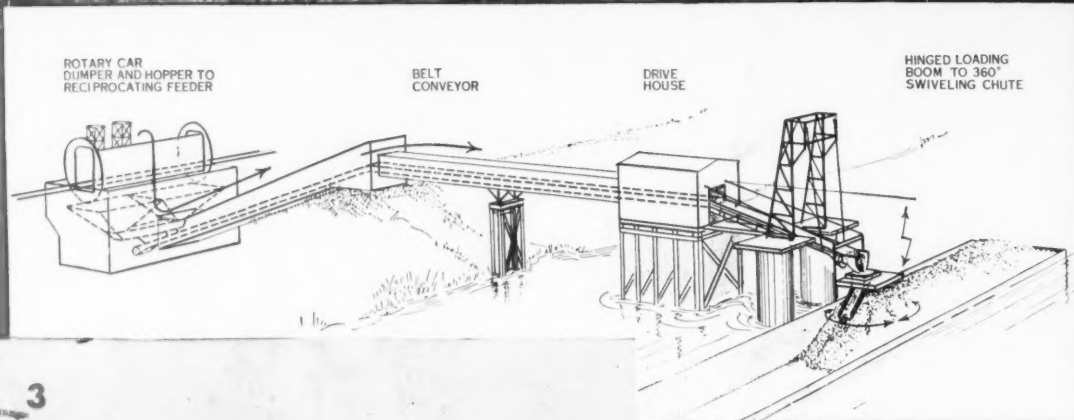
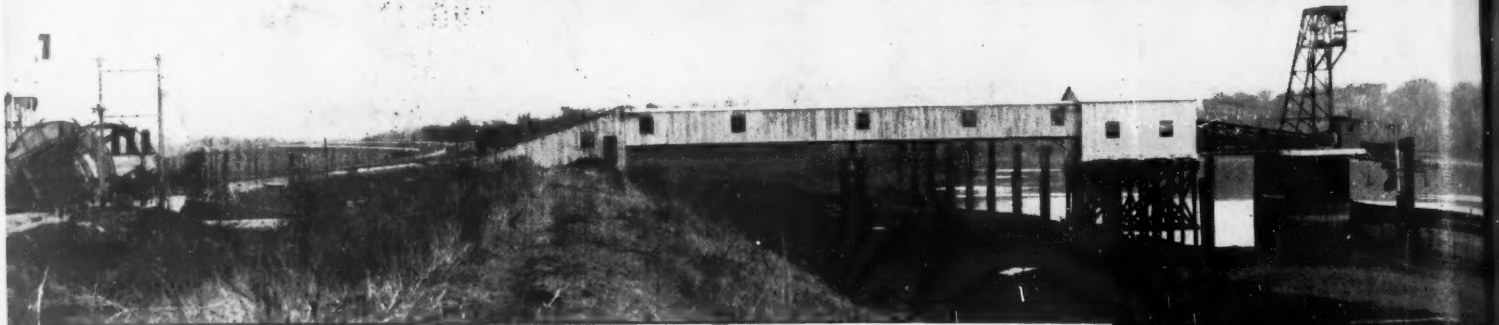


HAZARD WIRE ROPE

A DIVISION OF AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

LINK-BELT Car-Dumper-Conveyor System Solves Problem for TRUAX-TRAER



- 1 General view of car-dumper-conveyor system as diagrammed in drawing above.
- 2 Section of inclined belt conveyor receiving coal from reciprocating feeder beneath rotary car dumper.
- 3 Link-Belt rotary railroad car dumper which unloads gondola cars to hopper below ground level.

• Operating at a capacity of 500 tons per hour, the Link-Belt car-to-barge coal handling system of Truax-Traer Coal Co. at Liverpool, Ill. has a number of interesting features.

The transfer station consists of a rotary car dumper, two 100-ton twin hoppers, two reciprocating feeders with remote control for regulating the feeder speed, and 337 feet of 48-in. belt conveyor. The belt conveyor is on an 18 degree incline from the feeder to the top of the levee, an incline distance of 133 ft. It is horizontal for approx. 150 ft. to the back end of the loading boom which is 55 ft. long and which can handle fluctuations in river level up to 25 ft. At the end of the boom is a swivel chute for barge loading and trimming. This chute always remains in correct loading position regardless of position of boom or water level.

Our engineers are specialists in cutting costs and raising coal handling preparation capacity with integrated systems. Let us show you some of the results we have accomplished.

LINK-BELT COMPANY, Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toronto 8.

COAL PREPARATION AND HANDLING EQUIPMENT

Engineered,
Built and Backed by



LINK-BELT